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How Business Intelligence has changed management accountants' profession and roles?

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Abstract

Technology is an ever changing phenomenon which effects widely to organizations and different members in them. Enterprise Resource Planning (ERP) systems influenced management accountants' job description in the past and nowadays Business Intelligence transforms their roles even further. Some may be worried that their job will disappear because of routinization and automation of manual work, but this only means that new tasks and responsibilities are directed to accounting professionals. They can use the time saved for example for more in-depth analysis and strategic work. Past studies have not put enough emphasis for this change, instead academics have researched widely ERP implementation, and thus it seemed rational to study BI in accounting environment. The goal of this research is to study how Business Intelligence has changed accounting profession and management accountant's role and presents a more comprehensible definition for BI than just some certain system.

The research was conducted by first studying relevant literature about Business Intelligence and development of management accountants' roles and constructing a literature review. There are not lot academic writings about this phenomenon, hence the deficit of relevant studies was brought to day light. After some discussions and consideration, field study seemed to be appropriate method to study the subject and 8 semi-structured interviews were conducted. Interviewees were management accountant and represented different business fields and amount of experience varied to obtain interesting findings. In the end empirical findings were connected to prior literature and there was a comparative discussion about the phenomenon and conclusions were made.

The findings implicate that management accountants clearly have more comprehensible role than before and issues like future and business orientation are emphasized in modern organizations. ERP systems have lacks and BI complements those systems by offering views to future. Additionally new skills are required from management accountants such as IT and social skills. The expanded definition of BI is presented and through empirical findings it is evident that BI can be understood as much more than just a specific system per se. Usually the main task of these systems is to collect data from different sources and combine it to sensible information and knowledge. Moreover BI systems should not be implemented just because other companies are doing it, but organizations have to really analyze what do they use these systems for and what are the possible benefits from them, hence the implementation cannot be an intrinsic value. New kinds of roles were found for management accountants, which were consultant and educator to mention few of them. In the future there will be probably much more new ones related to data management or something similar.

Keywords business intelligence, enterprise resource planning, role of accounting, management accountant, knowledge management

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1 Introduction

In the contemporary world technology and intelligent decision systems are developing and getting more attention and one reason is that it decreases lot of routine and manual work (Kahraman, Kaya and Çevikcan, 2011). Technological innovations have shifted from simple accounting systems into Enterprise Resource Planning (ERP) systems and moreover Business Intelligence (BI) has developed data utilization even further (Elbashir, Collier and Davern, 2008). This has resulted in work life changes for example a transformation in management accountant's job description and it has transformed drastically from the traditional bean-counter metaphor, which some argue that it does not fully apply in the modern world (Vaivio and Kokko, 2006). This study will concentrate on these two areas of accounting research focusing on the connections between introduction of Business Intelligence systems and role change of management accountants (Rom & Rohde, 2006).

Lot of the accounting information systems studies have focused on technological side of ERP systems, implementation process, critical success factors and reasons for failed projects (Järvenpää, 2001). Those projects are usually really time-, resource-consuming and risk of an unsuccessful ERP project is always a reality. In this study I want to concentrate more on fairly new phenomena called Business Intelligence and what additional value it brings compared to other systems. Additionally, prior studies of management accountants' role have usually concentrated on the transformation from traditional bean-counter to more comprehensive business controller. (e.g. Granlund & Lukka, 1997 and 1998; Järvenpää, 1998, 2001; Smith & Briggs, 1999; and Vaivio & Kokko, 2006) These studies got lot of attention in the late 90s and after the millennium. Authors have studied personal and cultural factors which effect on management accountant's role in organizations. The development of a business controller is studied quite widely in different national contexts, but also what are the new characteristics demanded from them. (e,g. Granlund & Lukka, 1998) For example, the authors demonstrated that management accountant's role has become much more comprehensive as characteristics like social skills and business-orientation are essential. However, the old-fashioned watchdog and number-crunching bean-counter has not disappeared completely and this role seems to hold on quite strongly in traditional centralized organizations whereas in decentralized organizations the traditional role has almost perished (Granlund & Lukka, 1997).

Motivation for this research comes from its topicality because Business Intelligence systems, even though those systems have emerged a while ago, are a hot topic since information overflow is happening and companies need to learn how to utilize data that they produce (Chaudhur, Dayal and Narasayya, 2011). Additionally, Business Intelligence systems are evolving as the time passes and this will bring advancements to the technology and new innovative ways to utilize it (Elbashir et al., 2008). Accounting personnel are deeply involved in this technological revolution, since they create and process lot of information and their role is evolving from a traditional bean-counter further towards a business partner for the management team (Vaivio & Kokko, 2006). Need for a real-time information and flexible ad hoc reporting is also part of the reasons why companies are so interested in Business Intelligence. (Chaudhur et al., 2011) More generally utilization of information technology is almost a survival factor for creating competitive advantages and succeeding in international business environment (Popovič et al., 2010). This is achieved by better decision making with the help of sophisticated Business Intelligence applications (Hannula and Pirttimäki, 2003). Moreover, Business Intelligence systems have a great potential to gain information asymmetry (Marchand et al., 2002) thus differentiation from competitors is vital.

Another reason for the motivation is that prior research has not studied this phenomenon enough, thus it needs a closer look and there is a clear research gap. Lot of attention has been directed to the relationship between ERP systems and management accounting but limited studies has been done about the other components of the Internet Information Services (IIS) (Rom and Rohde, 2007). Investments in Business Intelligence systems prove that their strategic importance is growing, hence more research and attention is needed (e.g. Ghazanfar, Jafari and Rouhani, 2011; and Kahraman et al., 2011). Many articles, which are concentrating on Finnish context, are referred to in this thesis. (e.g. Granlund & Lukka, 1997, 1998; Järvenpää,1998, 2001; Vaivio & Kokko, 2006) Academics are still trying to find more general findings which apply in other countries and international environment as well. Hence there is lack of studies that deal with international context, since more and more companies compete in global markets and business intelligence is related heavily to that matter. Additionally, the importance of Business Intelligence systems as an important strategic decision-making tool is ever-growing and it needs more attention in research studies (Elbashir et al., 2008). It would be interesting to understand better, what is the value of Business Intelligence systems and what is their purpose, thus the thesis is studying additional benefits compared to ERP systems (Ghazanfari et al., 2011). One view suggests that accounting scholars should follow more intensively the

developments in IT and IS (Information System) practices and studies, because Accounting Information System (AIS) researchers have precious technical knowledge which could be utilized in management accounting research (Granlund, 2011). Researches in the future should also explore the expanding phenomenon to understand more clearly the impact of management accountants' role changes in organizations and in Management Control (MC) systems' function (Elbashir et al., 2011). To sum up more attention should be given to Business Intelligence tools and how companies can exploit for example controllers and accounting function.

1.1 Research objectives and research questions

Research objectives relate to demonstrating that more studies should be made about Business Intelligence effects on different matters and especially on changes of traditional ways of working. (Dechow, Granlund and Mouritsen, 2006) In the future the amount of information will only grow larger thus ways of making data comprehensible for management and others becomes ever more important. Many studies about management accounting transition are nationally focused hence creating limitations for the findings. However, in many situations conservative generalizations can be made because the world is more and more intertwined (Granlund and Lukka, 1998). The thesis tries to demonstrate how the phenomenon is already happening now and its importance will only grow in the future. Moreover, developments in the Business Intelligence area have made it more realistic and sensible for organizations to implement them. Finding new competitive advantages is a continual struggle for companies and if they do not adapt for the new business environment and challenges, it is very likely that they do not manage (Popovič et al., 2010).

Another objective is to study what additional value does BI systems provide compared to traditional ERP systems. (Koupaei, Mohammadi and Naderi, 2016) Of course implementation of a new Business Intelligence solution has to have reasons and companies cannot just implement it for the sake of it. Hence organizations need to really analyze and weigh how they can improve their operations and processes with the help of Business Intelligence (Elbashir et al., 2006). Moreover, the support for decision-making is a vital attribute of these systems, and we will take this factor into account (Cheng, Lu and Sheu, 2009). One kind of a sub-object for this thesis is to analyze BI as a concept and find a suitable, comprehensible but also a compact definition for the term. Thus I try to find different definitions, analyze the purpose of BI and clarify how people perceive it? To sum up the goals

I want to still stress about the fact that this research tries to search ways how management accounting and especially accounting as a profession has changed during the evolution of Business Intelligence?

This thesis has a main research questions and few sub-questions. The main one is:

1) How Business Intelligence has changed accounting profession and management accountant's role?

And sub-questions are:

2) What kind of new roles have management accountants received and taken?

3) What additional value has Business Intelligence systems brought to accounting profession compared to ERP systems?

As mentioned before there are not a lot of studies on this particular phenomenon, so there is lot of ground to cover. However, in order to create understandable thesis, we need to have restrictions and limitations for the studies. Järvepää (2001) presents three dimensions; innovative, personal and development of the accounting information systems that relate to management accounting function and roles. Mostly this research will highlight the information system aspect and add some interpersonal views. Especially the ones that are related to the role of management accountant and especially new skills required from them. Innovativeness is of course related to the subject studied, but not lot of emphasis is given to it other than its context. In this thesis, the definition of Business Intelligence is expanded, so knowledge management is also within the limitations of the study. One interesting argument is that "contemporary economy is not based on natural resources" but instead replaced with intellectual ones (Olszak and Ziemba, 2003). Some of the companies that I will be interviewing do not have, what one would consider, a Business Intelligence system per se, but the expectation is that information technology has modified even their management accountants' role and job description. Kahraman et al. (2011) present that information is playing an ever growing role in organizations and it is a hot topic in information management research. Another argument is that knowledge and information "represent the fundamental wealth of an organization" (Ghazanfari, Jafari and Rouhani, 2011), moreover it is argued that IT is "involved in most affairs in modern organizations" (Rom and Rohde, 2007). Different size, area of business and

maturity companies are interviewed in order to give comparative findings, which is one objective of the method, field study, used in this thesis. Also the causality is considered to be one-way, even though some authors argue that it is actually bi-directional (Gullkvist, 2013), but this notion is left outside of the scope even though it is a limitation of the study. However, Granlund and Malmi (2002) argue that ERP are more likely to have an effect on management accounting practices than other way around. Furthermore, business process performance is included and mentioned in many of the studies, but those are left without greater focus in this thesis (e.g. Elbashir et al., 2008). In the same article it is mentioned that generally industry should be acknowledged as important element of IS research, but this thesis does not emphasize the differences that much.

Even though many of the articles that have been included in this thesis are concentrated in Finnish context (e.g. Granlund and Lukka, 1997, 1998; Granlund and Malmi, 2002 Järvepää, 1998, 2001; and Vaivio and Kokko, 2006), this study will not try to differentiate which findings are related to Finnish and which to international context. Of course there are many special characteristics in these studies that explain better the concept of management accountants' work in Finland, but the aim is to reach findings that apply in other environments as well. Granlund and Lukka (1998) concentrate on cultural factors that affect management accounting, but this study does not concentrate that much on the cultural characteristics as on developments in new technologies, which enables for example automation of routine accounting tasks. However, the culture of cross-functional cooperation and its consequences is dealt with.

1.2 The chosen method

In this study the most appropriate method to study the phenomenon seemed to be a field study. (Lillis and Mundy, 2005) Authors argue that the method has been underexploited and it involves benefits like supplementing theory by empirical interpretations, thus gaining managerial implications, generalization and credibility of field-based theory refinement. These are factors that many only qualitative and quantitative researches are missing, thus combining some characteristics from both should result in better understanding of the phenomenon and presenting comparative findings which can be analyzed.

For the study I concluded 8 interviews and the interviewees were mainly controllers, CFOs and Business intelligence software providers. A popular method, case study, could have been an option since it has been widely used in management accounting research within its organization context, but after careful consideration I decided to go for a field study, in order

to interview few different companies to get more generalized findings (Lillis and Mundy, 2005). Of course one of the limitations was that no in-depth research was conducted, thus some of distinctive characteristics may not be acknowledged. However, the thesis tries to establish findings that are more valid, generalizable and comparable in other organizations as well. Ahrens and Dent (1998) also argue that theory without interesting empirical evidences is "rather empty" and equally empirical findings presented without confluence to theory is "blunt and boring". Thus these two aspects are at least tried to be emphasized during the thesis project.

I constructed a theme interview template, so the discussions would stay more open and not too directional. However, in order to keep the focus in the interviews, questions have to be thought carefully in order to get relevant empirical findings and sometimes the researcher might have to re-direct the interview back to the right tracks. One common set of questions were made for management accountants in companies and for Business Intelligence service providers, but the latter had some additional questions. I divided questions in same manner than theoretical part of the thesis, so the themes were; Business Intelligence and advantage from it, how has accounting profession changed, and the impact of Business Intelligence to management accountants' role and job description. During the process, questions were also revisited to match better the objectives of the thesis.

Some of the interviewees are contacts from my previous job as an account manager for a recruitment company and some of them are former students of Aalto University, who have obtained controller-type jobs. Even though these latter individuals might not have long working experience, they seemed to have good insights on how the contemporary technology will change the role of management accountants, even if the change has not happened yet in their employer's company. However, the goal was to find also individuals who have worked longer period of time in accounting function and they have seen the traditional change of management accountants from bean-counters to vital business partners for the management team. This is also why Business Intelligence providers are interviewed, since they have seen the change in many companies. Interviewees with more experience provide also a good knowledge about the decrease of manual work and how the role has been changed towards more analytical responsibilities during years and decades. Also it was interesting to see are these younger controllers more social and used-to small talk, which has been said to be one of the changes of management accountants' characteristics during the years.

It is argued that in field study method a vital part is to establish working or initial hypothesis which will steer the data collection and analysis process. (Atkinson and Shaffir, 1998) It could be said that this thesis initial hypothesis was that Business Intelligence will bring additional value and functionalities compared to ERP systems, which will also change the role of management accountants in organizations. Additionally, another hypothesis was that new skills are required from this function and to sum up the role is and will be ever more comprehensive, since manual work is decreasing and the time saved can be used for other activities like more extensive analyses.

The research questions allow the thesis to study different scenarios and companies, which will be the subject of comparative analysis. The goal was to choose companies, which size, field of business and maturity differs in order to collect broad empirical findings. This does not mean that no generalization objectives exist for the thesis. The research wants to highlight the development of the technology and underutilization of it in theory creation and organizations.

1.3 The structure and scope of the thesis

The structure of the thesis is following quite traditional thesis structure. First I start with the introduction where the most important literature is referred and some main findings and conclusions are presented. Moreover, this section discusses about motivation for this study, how BI solutions are relevant right now and why companies and scholars should pay special attention to it. After I have presented some main researches and their findings, I will move into the area that has not been studied enough, thus presenting the research gap. Moreover, research questions and research objectives are presented and the first chapter concluded with the structure of the thesis.

In the literature review I handle prior studies that relate to Business Intelligence and what additional value has it brought compared to ERP systems. Additionally the chapter discusses about management accounting profession and changes in it. Final part of that chapter is combining these theories and presenting findings of Business Intelligence's impact on management accountants' role. Thus literature review is divided into three parts. Essential definitions and theories relating to the phenomenon are considered and discussed. Business intelligence chapter studies the origin of these systems which are connected to ERP systems and how has the functionality widened because of BI solutions. Important objective of the

thesis is also trying to answer to the question; what is the point of BI system and why have they been originally developed, so search for the purpose. The theory of knowledge management is essential part of Business Intelligence hence it is studied as well with the help of for example data warehousing and OLAP (Online Analytical Processing). Another part of literature review is about the transformation of management accounting profession and development of the role. This section brings theories and presents studies about management accountant's role and how it has changed as the time has passed, and how the traditional bean-counter role has emerged to something completely different. Research papers that have highlighted the more comprehensive role of management accountants are used as a resource to better understand the phenomenon and its importance. The thesis tries to prove that manual and routine work of management accountants has decreased, giving more time to more strategic tasks. New roles also mean new skills and competencies which are also brought into the light. The final part of the literature review has a special focus on technological innovations, in this context accounting information systems, Business Intelligence, and what is the causal effect to management accounting professionals' role and job description?

Thirdly the thesis needs an appropriate method to study the empirical side of the subject. This section deals with research method that is used in this study, and the collection process of empirical data. Furthermore justifications for the method are provided. The most suitable method for this research seemed to be field study and interviewing about five to ten management accounting professionals and Business Intelligence service providers face-to-face from different companies. This should also bring validation and reliability for the research since it is not tied to only one case company. However, it also means that it was not possible to collect more in-depth insight from particular company, but the research objectives do not necessarily demand that either. If additional information was needed from the interviewees, then more discussions or emails were used to get the necessary information.

Fourth part of the thesis is empirical research. Here I present and summarize what kind of interviews were conducted and what were the key findings from the real business world. The chapter was constructed to follow the structure of the literature review in order to make it as comprehensible as possible for the reader. The individuals for interviews were decided and found from personal network and I tried to choose different sized companies that have variety in Business Intelligence systems, in order to get broader understanding of the phenomenon and get comparative findings. The selection criterion was to have at least few larger multinational companies, but also smaller service-companies or startups which work in global business

environment. This is because it is argued, that lots of Business Intelligence benefits are realized more clearly in international environments (Kahraman et al., 2011). At the end of the chapter

In the fifth part I will connect prior studies and their findings to the empirical ones, thus there are discussions about the similarities of these two; the real world compared to the theory and prior studies. It is also interesting to see has the new technology actually decreased manual work of management accountants which is assumed in many of the cases, or has data collection and processing actually increased the manual work.

The final section is about the main findings of the studies and conclusion. Here the aim is to sum up how theory and empirical findings support each other. Also answers for the research questions are provided and I analyze has the thesis reach it objectives. Discussion about the research's limitations is demonstrated and I present possible future studies, which would be interesting and useful to conclude.

2 Literature review

This section deals with previous studies and acts as a literature review and additionally relevant definitions and theories are provided. Main findings about the theory and researches of Business Intelligence, developments in management accounting's role and moreover their relationship are put in focus. As it is stated, Information Technology is shaping organizations and accounting is seen deeply intertwined with it, thus in contemporary world accounting would be underutilized without IT (e.g. Orlikowoski, 1992; Granlund and Mouritsen, 2003; and Dechow et al., 2006). The chapter starts with the evolution of Information Technology mainly from ERP systems into more advanced IS (Information Systems) and analysis tools which are referred as Business Intelligence. The goal is also trying to understand how IT has evolved quickly and brought many changes in the last decades and why there is a need for more strategic approach towards new and complex systems? (e.g. Rom and Rohde, 2007; and Koupaei et al., 2016) ERPS have been studied a lot and even though it is not a center theme of the thesis, theories and frameworks related to it provide good base knowledge for this study. More like I focus to the additional value that BI systems introduce compared to the ERPS and it is good to acknowledge that these two technologies are not competing with each other, but rather they are complementing technologies as ERP databases are utilized in BI solutions. The aim is to search for the purpose of BI systems and why were they arisen in the first place? Knowledge management is added to expand the definition of Business Intelligence thus I present an explanation how the concept is understood in this thesis. The thesis provides evidences on how Business Intelligence systems provide support to the decision making process of managers and why is it essential to have more accurate real-time information for organizations? Furthermore, some problems and weaknesses with Business Intelligence systems are brought forward. These reasons might explain why the implementation of these systems has been quite underutilized.

Second section of this chapter discusses about the development of accounting profession and how the traditional role of management accountants has changed in the course of time. The metaphor bean-counter is introduced and how the originating of controllers already brought more responsibilities to management accountants. Focal theories and frameworks are explained and I also include some theories about roles and the development of

them. The hypothesis is that management accountants' new roles have become more comprehensible and they have to be more social, business- and future-oriented, but also sometimes educators and strategic partners of executive level managers and others.

Finally, I intertwine these two sections together and try to answer to the research question; how has Business Intelligence changed accounting profession and management accountant's role? This is the most essential part of the study and the aim is to gather interesting and important researches about the subject and what areas have still been unexplored? Hence I want to add something extra to existing theories with the help of empirical findings. Some central themes are decrease of manual work, effect to traditional management accounting, management control and required new skills from management accountants, which are related to the introduction of Business Intelligence solutions.

2.1 Business Intelligence

In this part I will provide the central definitions and theories about Business Intelligence and some other IS to the reader, in order to get familiar with the concepts that are discussed later on in the literature review. Even though it is quite generally accepted fact that Business Intelligence creates business value, the justification of investments economically is not always explicit, however business-oriented knowledge is achieved by collecting and analyzing internal and external information (Popovič et al., 2010). The aim of this section is to establish a comprehensible definition for Business Intelligence, or system, in order to know; and what does it mean when people refer to Business Intelligence? Business Intelligence was introduced as a grand umbrella term by Howard Dresner in 1989 and it meant "*set of concepts and methods to improve business decision making by using fact-based computerized support system*" (via Ghazanfari et al. (2011). Ghoshal and Kim (1986) provided the first scientific definition when BI was explained as management philosophy and a tool which aim was to support more effective decision making by managing and refining business information. Williams (2004) continues that the concept of Business Intelligence grew up in the 1990s, because organizations needed to harness all-around information which was produced by IT systems. This information is used to gain insight for profit and business opportunities. An additional definition by Lönnqvist and Pirttimäki (2006) argues that BI can be used when referring to concepts like; knowledge of an organization which describes the business environment, organization, market conditions, customers and competitors, and systematic processes for decision making by

collecting, analyzing and spreading information. Some argue that there are distinct differences between traditional information support systems, which are for example decision support systems and executive information systems, and Business Intelligence solutions where the first ones are more application oriented and the latter represents broader concept technologically which will be discussed later in this chapter (Popovič et al., 2010).

Another complementing definition talks about BI when data from all different sources is formatted in a new way in order to make business and result-oriented decisions. Elbashir et al. (2008) mentioned that this supporting role for decision making extends to different organizational levels, thus from lower management levels to the executive ones. Additionally, some critique has been directed for defining Business Intelligence. For example, from the empirical side Arnott and Pervan (2005) argue that Business Intelligence has been poorly defined term and the problems arise from the dilemma of software vendors and consulting organizations using BI definition to suit their own offering. The critique also stretches to scientific literature, where there is ever growing number of definitions for BI. Business Intelligence system is also sometimes used to mean decision support systems and broader technological concept which includes for example knowledge management (Popovič et al., 2010). I will concentrate on the concept of knowledge management and what does it mean in BI environment later on in one of the sub chapters.

One general definition for this kind of Information Systems is Enterprise system (ES) which include for example ERP systems, CRM (Customer Relationship Management) and SCM (Supply Chain Management) systems (Ghazanfari et al., 2011). Those systems are meant to store and collect real-time data which is located in central databases (Davenport, 1998). Koupaei et al. (2016) talk about how manufacturing companies are always searching for the most up-to-date systems and technologies, because they need to address the challenges and customer-driven market. There is another related term, integrated information system, which is basically an integrated combination of systems where the data is located in a shared or common place (e.g. Bhatt, 1995; Booth et al., 2000; and Wall, 2003). ERP systems are also a part of the thesis since they act as databases and data warehouses for BI systems in many occasions. Some say that BI systems are often enhancements for ERPS (Elbashir et al., 2008) and nowadays those systems are often web-enabled and inter-organizational (Rom and Rohde, 2007; and Chaudhur et al., 2011). The focus for this thesis is also to explain what traditional ERP systems lack and what additional value BI systems bring for organizations compared to those systems? Popovič et al. (2010) argue that to really gain the benefits from BI,

organizations need to understand the vital characteristics of it and what is actually happening, and of course what are the steps or actions to take for achieving organizational goals?

According to Vakalfotis et al. (2011) ERP systems were an important addition to IS in the 1990s, when organizations started to collect and store information from manufacturing point of view. Moreover different functions for example finance, cost, sales, quality management and human resources were able to have centralized database for required real-time information. Researchers (e.g. Popovič et al., 2010; and Williams & Williams, 2007) explain that this real-time business knowledge is used to offer executives a better understanding and timely information to support decision making. ERPS are module-based combinations of different software which guide all the material, monetary and information stream. (Bancroft et al., 1997; Curran et al., 1998; and Davenport, 1998) It is quite accepted fact that a successful implementation of an ERP system will help with data collection and integrating different function of the organization and management accounting is one function that benefits from it (Rom and Rohde, 2006). ERP systems communicate with external systems and a single database feature decreases redundancy and unnecessary updates in subsystems, when data is usually entered only once in the place where it originates (Davenport, 1998; and Granlund & Malmi, 2002).

Business Intelligence systems can be defined as "*collection of decision support technologies aimed at enabling knowledge workers such as executives, managers, and analysts to make better and faster decisions*." (Chaudhur et al., 2011) Authors like Hannula and Pirttimäki (2003) add that the information needs to be timely, relevant and easy to use which will in turn enhance decision making process. In order to understand Business Intelligence as an element of a wider Information System combination, a figure is presented to better understand the relationships between different components (Vakalfotis et al.. 2011).

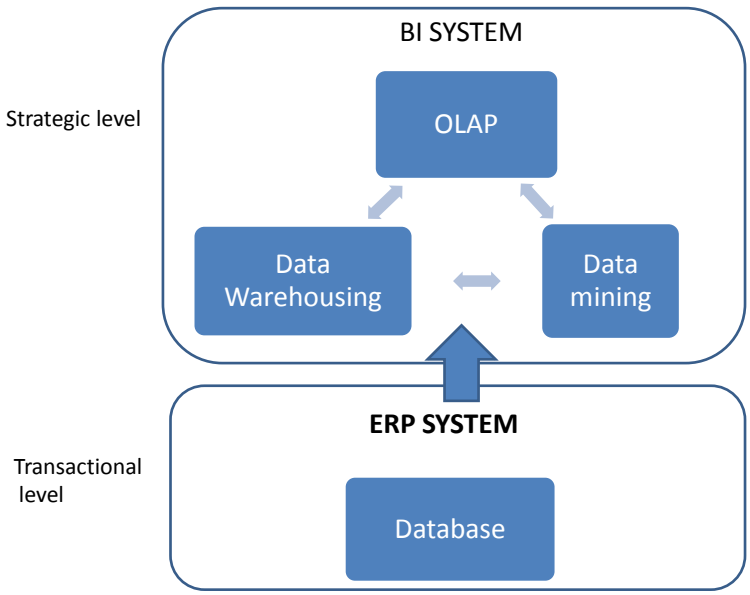

Figure 1: ERP integrated BI environment by Vakalfotis, Ballantine and Wall (2011)

To explain it more accurately, this approach argues that Business Intelligence systems are formulated from three connected tools which are OLAP (online analytical processing), data mining and data warehousing. Teorey, Lightstone and Nadeau (2006) explained that OLAP is for quick ad hoc queries; data mining is a combination of algorithms in order to figure out patterns in the used data thus providing valuable information; and data warehousing is for storing, sustaining and retrieving past data. Data mining can be also defined as a tool to make in-depth analysis of data, to further construct predictive models (Chaudhur et al., 2011), and moreover it allows knowledge acquisition with the help of statistical methods, mathematical modeling and artificial intelligence technology. (Olszak and Ziemba, 2003) They continue that OLAP is a tool that gives the user an access to analyze and model business problems and moreover sharing important information which is located in data warehouses. Gullkvist (2013) continues that BI techniques also contain for example decision support systems, statistical analysis and visualization features. In order to make BI system function properly and give more accurate scenarios or forecasts about the future, they require specialized IT infrastructure, for example the ones mentioned before. Overall the goal is to analyze information to make better business decision based on statistical data. Popovič et al. (2010) divide BI structurally to two parts which are data warehousing, and accessing data, analysis of it, reporting and delivery.

In contemporary world BI tools are supporting decision making, analyzing, monitoring and controlling of operative tasks in ERP. (e.g. Koupaei et al., 2016; and Chaudhur et al., 2011) The goals might be re-structuring internal processes, cost reductions or increasing revenue. This is made possible by the fact that data from different sources is put together by BI tools and it allows executives to make analysis and decisions with the versatile information. The concept of Business Intelligence helps to utilize financial and non-financial measures in order to make integrated analysis and evaluation of an organization, and moreover to effectively manage an enterprise (Olszak and Ziemba, 2003).

2.1.1 Lack of traditional ERP system

Many scholars have argued that ERP systems by themselves are not enough in contemporary world, since it is vital to add intelligent tools in order to gain for example more flexibility. (Koupaei et al., 2016) As mentioned earlier, ERPS might act as a connecting piece of storing the essential data for further analysis purposes of BI, since there is lot of value in firm's data resources (e.g. Elbashir et al., 2008; and Azma and Mostafapour, 2012). Koupaei et al. (2016) also raised an important question related to the matter which will be partly covered in this thesis; "How can we use the potential data and intelligence of BI in ERP systems for the effective flexible manufacturing systems?" The short answer is that by implementing BI as an enabler for ERPS, more flexible manufacturing systems will arise. Moreover, ERP systems do not have by themselves wide analytical features, but they are enhanced with the introduction of BI solutions, since these systems can process massive amounts of business information (Elbashir et al., 2008). A clear underutilization is happening, where the analytical capabilities of these solutions are not been used to their full potential and many strategic management accounting tools could work as enhancements (Granlund, 2011).

ERP systems' functionality lacks the appropriate features to provide optimal decision making, controlling, monitoring operations and analysis of vast amount of data, but used in the right way BI offers these benefits. (Koupaei et al., 2016) Additionally BI solutions provide attributes like predictions with the required information and indicators to ERP's modules. These attributes with BI are highly useful because for example quality indicators are able to decrease or even prevent errors in the system. The integration of BI with ERP and CRM systems is already providing and will provide even more competitive advantages in the future (e.g. Liautaud and Hammond, 2001; and Olszak & Ziemba, 2003). To mention another

deficiency in using only ERP system is that retrieving all relevant information from the systems fails often, thus BI tools are required to develop the functionality. (Rom and Rohde, 2006; and Gullkvist, 2013) Even though ERP systems are usually large data infrastructure investments, BI adds value to them by opening better access to data resources (Burns, 2005; Wieder, Chamoni and Ossimitz, 2012). Chou et al. (2005) continues that BI solutions are a way to access data in a superior manner, analysis of data is better and overall the tools actually improve the performance of ERPS. Moreover, BI solutions are argued to be "*critical in helping organizations to adapt to change and improve its performance*" (Watson and Wixom, 2007).

The underlining problem is that many companies lack or experience underutilization of Business Intelligence for example in their production function and processes when using ERP systems (Ghazanfari et al., 2011). As mentioned before, ERP systems lack many qualities by themselves, but when BI characteristics are add it will enrich them and have actually a great boost to the role of management accountants. (Vakalfotis et al., 2011) However it seems clear that ERP systems are not contrary to BI systems, but instead BI tools are seen as intermediary for the ERP systems hence complementary systems would be appropriate way to speak about the matter (Koupaei et al., 2016). BI systems are designed to bridge the transactional efficiency and sit on top of ERP systems aligning it to strategic activities such as planning. Thus these solutions include tools which help with data analysis, reporting and query, and in the end serve as strategic decision-making systems (e.g. Fahy, 2001; Bucher et al., 2009; and Vakalfotis et al., 2011). Additionally, benefits according to Vakalfotis and others are the improvements in data collection, enhanced analytical abilities, advance reporting and for example budgeting tasks (Elbashir et al., 2008). Many of the problems mentioned before also depend on ERP system implementation which is least to say difficult for organizations. This is because configuration process is often multiphase project where different modules may delay the configuration, thus the phrase applies here as well "*everything depends upon everything else"*. (Granlund and Malmi, 2002) Reasons for the problematic project are for example ERP system complexity, which relate to technical and functional-economic explanation, and traditional accounting tools like Balanced Scorecard (BSC) and Activity Based Costing (ABC) do not seem to integrate easily with ERP systems. Rom and Rohde (2007) found out in their studies, with the help of a survey, that ERP systems seem to be effective in transaction processing, but they do not yield well to reporting and supporting decision-making (also Booth et al., 2000; and Vakalfotis et al., 2011). Quite equivalent findings were made in Fahy and Lynch's (1999) research which was conducted with a field study method, and they argued that even though

ERP systems enhance the supplying process of transaction data for strategic management accounting point of view, they usually degrade existing decision support systems. Additionally, it is quite evident that many ERP systems are hard to modify and many of the times organization's own processes need to be changed instead of remodeling the actual system, which can be very undesirable for the actors in organizations (e.g. Davenport, 1998). Moreover, this also means that similar processes are implemented in competitors' companies, thus search for competitive advantage comes harder. Because of the reasons mentioned above, companies are searching for non-ERP systems, which support the analysis and reporting process and practices to be more flexible and user-friendly (Scapens and Jazayeri, 2003). These factors are related to the management accounting function, thus new technology such as Business Intelligence seems to have a positive effect to that function and tasks (Rom and Rohde, 2006).

2.1.2 Purpose of Business Intelligence systems

As the development of new technology is fast paced in contemporary societies, companies need to really think how can they utilize Business Intelligence in their own organization and implementing one cannot be an intrinsic value, thus evaluating benefits is necessary (Elbashir et al., 2008). Even though some authors argue that it is difficult to ascertain benefits for BI solutions, because they cannot be directly measured on the market or the effect on productivity is hard to demonstrate, and it would be easier to evaluate the costs, people try to enter into the advantages of these systems (Lönnqvist and Pirttimäki, 2006; Williams and Williams, 2007; and Popovič et al., 2010). BI is said to be quite vital in creating information and supporting decision making nowadays. (e.g. Popovič et al., 2010; and Koupaei et al., 2016) Companies are being able to utilize Business Intelligence from operative point of view, where technologies support wider business activities (e.g. Rogge, 2005; and Elbashir et al., 2008). Thus Business Intelligence solutions are used for operational and tactical improvements for processes, which has led to better customer service and supply chain management (Williams and Williams, 2003; and Elbashir et al., 2008). The transaction and operational data is transformed into useful knowledge by these solutions (Kahraman et al., 2011). Indirect benefit for Business Intelligence is better information quality (IQ), but the biggest advantage is argued to be the improvements of business processes, hence enhanced business performance which still can be a result from enhanced IQ. (Popovič et al., 2010) These business decisions are not only related to operative side such as product positioning or pricing, but also to the strategic ones. The role for BI is to establish an environment where operational data is transformed into strategic

business knowledge to help with scattered decisions of managers (Ghazanfari et al., 2011). The strategic aspect highlights wider goals, direction and priorities of the executive level management and in order to have quality data, it must come from both inside (financial and operative data) and outside (data originating from the market) of the company (Cheng et al., 2009). Definition of strategic decisions can be understood as decisions that relate to implementation and evaluation of organizational aims, vision and mission with long-term view in mind (Ghazanfari et al., 2011). The strategic goals also are fulfilled when these systems provide customer intelligence advantages, which are arguably "*the most cited benefits in BI literature*". (Elbashir et al., 2008) The advantage arise from better understanding of the customer and its future needs and buying habits, which helps to target the offering and reduce the time delivering products or services. Furthermore, customer segmentation and decrease of marketing costs, because of targeting, are mentioned which are supported by BI systems. Koupaei et al. (2016) go on about the flexibility in these systems, where it is possible to identify new markets and customers, thus target offering can be utilized.

The traditional intention for BI is to provide different systems the needed decision-making, data warehousing technologies, reporting, ad hoc features and OLAP that was mentioned earlier (Ghazanfari et al., 2011). Ideally of course BI systems enhance performance, boost productivity, increase transparency of processes and the use of it results in cost savings (Azma and Mostafapour, 2012). Another purpose for BI is to provide different methods and processes to improve decision making and more like support realization of an enterprise's strategy. (Olszak and Ziemba, 2003) The same research states that one of the main tasks for Business Intelligence is to incorporate intelligent exploration, integration and multidimensional analysis of data that comes from different locations. Kahraman et al. (2011) also stated that intelligence techniques "*obtain a successful business strategy in enterprise information systems*". Additionally, as mentioned before Business Intelligence can be a source for competitive advantage thus making it a key strategy to implement and integrate it effectively to other systems. (e.g. Ghazanfari et al., 2011; and Azma and Mostafapour, 2012) This can be achieved by using the intelligent information to proactively react to business environment changes. Elbashir et al. (2008) add that in order to achieve the benefits, Business Intelligence systems need to be integrated carefully into management and operational processes (also Williams and Williams, 2003). If we think about the purpose of these systems, authors argue that using in-depth information or knowledge, about for example environment, economic processes, customers and competitors, effectively and automatically results in massive benefits

and gains. Moreover, BI provides tools to do enterprise wide reporting, ad hoc queries, data mining, statistical analysis and most importantly proactive oriented tasks such as report delivery and alerting of suspicious deviations. (Cheng et al., 2009) The authors continue that the most sophisticated applications for BI are correlation, trend and predictive analysis which ultimately tries to produce necessary knowledge for management use. BI should provide end-user query and reporting, dashboard tools, and planning and modeling tools by integrating data in appropriate forms. (Ghazanfari et al., 2011) Furthermore decision tools have to offer the right and timely information for the right individuals in the organization to enhance strategic and operational decisions.

Although the benefits that come from BI solutions are often intangible and hard to quantify, there are clearly many advantages driven by these systems (Hannula and Pirttimäki, 2003). One of the major benefits in information systems and BI is that they can visualize comprehensible graphics about accounting information for different organization's members (Granlund and Lukka, 1997). Authors like Kouapei et al. (2006) argue that BI solutions help with evaluating forecasts accuracy, analysis of financial data and even empowerment of managers or other members of the organization. Authors see that it is critical to reduce time for decision-making process and overall enhance it, but also make the use of Business Intelligence proactive (Negash, 2004, via Kouapei et al., 2016). In more detailed example, BI can help manufacturing companies with customer support, order shipment, in financial services with claims analysis and fraud detection, and power usage analysis and in healthcare field with outcomes analysis (Chaudhur et al., 2011). One could almost say that the possibilities with BI solutions are endless. Lot of Business Intelligence's value comes from organizational learning, where the dynamic process of discovering new knowledge and spreading it afterwards to the right parts of the organization increases knowledge management and innovations (Azma and Mostafapour, 2012). BI solutions are also said to have quite an impact on effectiveness of organization's structure and processes, but also on development of competitive strategy (Elbashir et al., 2008). Some authors even argue that Business Intelligence systems provide the connecting peace between correlations of produced information or knowledge, and company's strategy. (Olszak and Ziemba, 2003) This is achieved by filling information gaps in the field of strategic and financial analysis and moreover by managing customers' expectations and the analysis of it. Organizations are finally moving from the questions like "*Where did you get those numbers?*" to more relevant and beneficial ones like "*What do the numbers mean?*" thus elimination of unnecessary and idiosyncratic ad hoc reporting and data analysis (Williams,

2004). In the end BI systems need to provide well-designed structure to disperse information and knowledge through organization boundaries consistently and reliably. (Koupaei et al., 2016) Moreover the data needs to be valid and good quality, so comparative analysis can be made and steering the company to right tracks is possible.

BI solutions are developed for facilitating users in making quite detail oriented analysis of data which originates from different resources for example from ERP system. (Elbashir et al., 2011) Therefore BI is able to provide a wide selection of pre-specified reports and business analytics, which can also support improved Management Control System's (MCS) capabilities. As covered before ERP systems integrate information from all functions, in the best case scenario, thus the system is able to offer visible goals for all organization's members (Dechow and Mouritsen, 2005; Kallunki et al., 2011; and Gullkvist, 2013). Some studies argue that the success of an implementation process, for example ERP system, effects to the benefits and management accountant's work. (Sangster et al., 2009) Additionally successful implementation process increases information quality and decision-making, and automates many usually manually produced reports. In Elbashir's research it is stated that nowadays BI is seen as the invention that can leverage the knowledge and data in enterprise systems databases in versatile ways but also support the expected change to a wider and more detailed MCS. In addition, BI has similar characteristics as ERP systems, as the latter ones are providing an easy and fast access to operational data, whereas management accounting as a function transforms this information into practical and relevant format. Gullkvist (2013) found out in his studies by respondents that advantages arisen from ERP systems and BI were for example more flexible production of information, better integration of applications and enhanced quality of reports. Quattrone and Hopper (2005) explain that BI is meant for leveraging very complex business data which has to be integrated with other data and information in order to create company-wide databases (also Granlund and Malmi, 2002). Many other benefits of Business Intelligence are related to accounting function, which will be further studied in the last part of literature review. However, to mention few advantages already by Williams (2007) which are integrating data from financial accounting systems and others, collecting multidimensional data and putting them into "*appropriate baskets of information",* enabling usage of complex cost models and examining cost dimensions. To mention few other applications from the same author for BI; analysis of cost and revenue drivers, Activity based costing (ABC), customer analytics, scorecards and simulations. Chaudhur et al. (2011) argue that for the last decade one of the most valuable tools introduced by BI is the enterprise search engines which support

keyword search paradigm. This feature is utilized for searches through emails, documents, purchasing history and supporting calls for customers. In addition, it is stated that BI tasks require looking through different databases within the enterprise and information might be siled in different kind of sources such as CRM, spreadsheets and user's desktop. (Chaudhur et al., 2011) The authors also say that one important aspect of above-mentioned process is that with the help of BI, the required information is being possible to be retrieved and ranked using the keyword search paradigm.

2.1.3 Knowledge management

In this chapter I deal with the expanded definition of Business Intelligence, so the term can refer to other things than only systems themselves. The aim is to establish understandable definition for knowledge management and how it relates to BI and can Business Intelligence exist without definite BI system. I also bring forward the fact that the amount of data, information or knowledge is increasing rapidly and constantly, and what problems may occur because of this phenomenon? Chaudhur et al. (2011) state that reasons for the change are decreasing cost of data acquisition and storing it, thus enterprises want to construct vast databases in order to win their competitors. One really good definition or utterance comes from English (2005): "*There is no such thing as Business Intelligence without the people to interpret the meaning and significance of information and to act on their knowledge gained*." He continues that BI can be understood as the ability to act effectively when utilizing company's human and information resources.

Knowledge can be seen as essential and strategic asset for companies which will in the end affect their success business wise. (Olszak and Ziemba, 2003) Authors add that knowledge can also be referred as intellectual capital or hidden assets, which are as important as financial capital, if the organization wants to meet its goals and vision, and moreover it can improve the assessment of potential profit generation. More detailed definition for intellectual capital is that it means quality of knowledge and its range, and also its input to the market offer. Authors list many different sources for the knowledge in their article but they also say that it is a result from organizations' and managers' experience and intuition. Azma and Mostafapour (2012) also explain how important exploiting true knowledge is when managing customers, which in the end is the profit making factor for every enterprise. Olsaz and Ziemba (2003) have similar kind of findings that enterprises relationships with customers develop quite important and vital

knowledge source. Furthermore, customers actually become development partners for companies, when knowledge and new innovations are results from the cooperation.

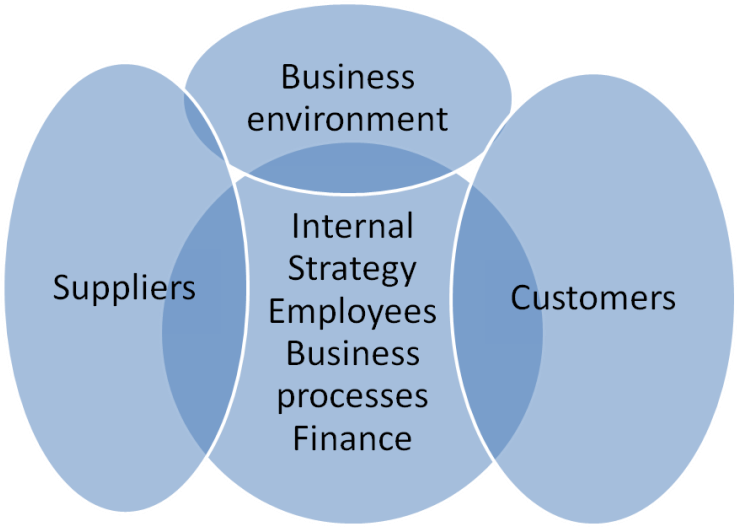

Figure 2: Broad concept of the term Business Intelligence by Popovič et al. (2010)

The figure 2 shows how different internal organizational and external factors relate to the way we understand BI and knowledge management. Popovič et al. (2010) argue that when organizations leverage their information assets within key business processes, they can enhance their performance of business drastically. Cheng et al. (2009) talk about how decision support and knowledge management should be closely integrated to create synergies, because these two factors are actually complementing each other. When companies retrieve, stock or spread knowledge through their organization it is called knowledge management, which ultimately should enhance and support decision-making models and improve the process overall. Activities in knowledge-enabled systems such as capturing, storing, leveraging and cleansing of data will also add the capabilities of creating value-added information which can have strategic influence (Nemati, Steiger, Iyer and Herschel, 2002; and Cheng et al., 2009). To get the most out of BI, organizations need to integrate decision support with knowledge management process. This is because knowledge management systems can actually improve how people work with each other and it is possible that individuals like partners and knowledge workers share knowledge more easily, thus working comes more effective (Lu and Cheng, 2003; and Cheng et al., 2009).

Hannula and Pirttimäki (2003) explain that many organizations which start to use Business Intelligence solutions do it because they are forced to collect data and knowledge about the

surrounding business environment. Moreover it is about how the situation is going to evolve as time passes, but also the whole process supports their operational activities. Knowledge management can also be understood as intelligent decision support system (IDSS) which means that artificial intelligence (AI) techniques are utilized for the support of decision-making. (Kahraman et al., 2011) Actually these techniques and systems have quite long history originating from 1980s and terms used back then were Knowledge-based systems (KBS) and above-mentioned IDSS (Holsapple and Whinston, 1987). Kahraman et al. (2011) continue that IDSS should actually act like consultants and its aim is to support managers with their decisions and this is done by collecting and analyzing information, recognize and diagnose possible problems, and finally give suggestions for correct actions. The collection and absorbing process of external information is coming ever more important when acting in competitive environment, thus companies have started to enhance their organizational absorptive capacity to harness benefits of Business Intelligence and knowledge management (Elbashir et al., 2011)

Even though the amount of information is ever-growing, organizations and knowledge workers have already figured out ways to utilize vast amount of information effectively. This is possible, because knowledge and information "*can be generated by capturing existing (shared) knowledge via filtering, storing, retrieving and disseminating explicit knowledge and by creating and testing new knowledge"*. (Nemati et al., 2002. via Cheng et al., 2009) The mentioned integration between decision support and knowledge management plays also vital role for gaining international competitive advantage by creating their own niche BI or knowledge (Cheng et al., 2009). Chaudhur et al. (2011) state that nowadays companies summon vast amounts of data at a finer granularity, thus sensible and low-cost data platforms are desired to support ever increasing quantity of data. This is also referred to as the modern trend term called Big Data, which is coming very popular and an object of interest in enterprises. It is an interesting fact, and it relates to the subject of accounting profession change that will be dealt with in the next chapter. For example Granlund and Malmi (2002) explain how managers usually lack the needed skills or time to process Big Data, which is why accounting function might have the best individuals to take the challenge. Moreover, this proves that accounting personnel will be always needed to transform multidimensional data into information and finally into organizational knowledge. Some challenges arise from information overflow and one of them is using data management and information correctly in order to modify fragmented data to something that is useful, so creating knowledge that can be used business wise (Azma and Mostafapour, 2012).

2.1.4 Possible problems with Business Intelligence

Even though BI and actual systems have been appraised quite a lot, there are underlining problems that might arise with the introduction or implementation of BI systems. Of course the use of BI cannot be intrinsic value, but realizing the need or benefits of them have to be analyzed carefully, so members of the organizations are not using these systems just for the sake of it. The information produced by management accountants can also be incorrect, thus effecting negatively for decision making (Granlund and Lukka, 1997). Some problems might occur if the organizational culture is against BI and the purpose has not been explained clearly enough. (Williams, 2004) Additionally, too complex and sophisticated IT systems can be scary and people may see them as a threat for their own position, if their work becomes obsolete after implementing BI systems. The author also states that for example CFOs might not want to implement these systems if they feel that they have negative effect to ERPS functionality and usability, but that is rarely the case. Some problems that relate more to ERP systems than BI are difficulties to change implemented systems, especially if the configuration has been a big disaster, thus "*companies have to live with their failures*". (e.g. Dechow and Mouritsen, 2005; and Rom and Rohde, 2007) Additionally, it is argued that some management accounting tools such as ABC and reporting have to be left out from ERP systems, because the systems are too complicated (Granlund and Malmi, 2002).

According to Frolick and Ariyachandra (2006) one thing that might have slowed down the utilization of BI solutions is the lack of systematic means of planning, monitoring, managing and controlling the deployment of strategic goals. Lot of organization members feel that much different kinds of data and information can be produced, but the usefulness and level of satisfaction has stayed relatively low despite the highly developed information systems. (Olsaz and Ziemba, 2003) Additionally employees and departments can compete with each other of possessing vital knowledge which they can leverage for their own benefit in the future, thus complete knowledge distribution fails (via Mierzejewska, 2002). As it is discussed in this thesis, information technology is not always the answer for the problems organizations are having, because they might actually generate new problems if the integration is incomplete. (Dechow et al., 2006) Keeping the focus of the thesis in mind, also the complicated relationship between accounting function and IT may create new problems such as more complex organizational structure and giving too much power to them who dominate the calculation and information field. Granlund and Malmi (2002) add that if the information is integrated almost perfectly so are the faults in data.

2.2 Development of accounting profession

This chapter is going to deal with the role of management accounting function in organizations and relevant theories and frameworks. We start with the central definitions and who we include in the scope of management accountants. The idea is to explain the traditional role of management accountants' and how the evolution of bean-counter has turned into business and strategic oriented controller or something else. (Granlund and Lukka, 1997, 1998; Järvenpää, 1998, 2001; Smith and Briggs, 1999; and Vaivio & Kokko, 2006). It is expected that the role of management accountant has become more comprehensible with lot more responsibilities and skills required (Järvenpää, 2001). In contemporary world management accounting professionals can be seen as business oriented controllers who for example have to have good knowledge of financial analysis and about the business itself that the company is in and moreover communication skills and expertise on running change projects are highlighted. (Granlund and Lukka, 1997). The authors also mention future-orientation for controllers as an important factor. However they argue that in many occasions the bean-counter and business controller do not exist in same individuals at least not simultaneously. Scapens et al. (2003) identified that there are needs for more clear management control theories, since changes in management accounting has resulted in cross-functional teams and changes in business processes. Moreover management accountants are involved in strategic and operational decision-making. Thus one tangential theory which has been taken into account is the role theory (Kahn et al., 1964; Katz and Kahn, 1978 via Byrne and Pierce, 2007), which deals with organizational roles (the focal roles) and how they "*are determined by the expectations of other members of the organization (the role senders)*." These role senders are in fact impacted by organizational factors such as structure and size, and characteristics of the individual and the role sender's relationship (Byrne and Pierce, 2007).

Byrne and Pierce (2007) present that usually management accounting has been seen as quite central factor for implementing and enacting with management control in organizations, which also brings "*feedback and feed-forward loops of cybernetic control models*" along. Typically, at least in Finnish context management accounting practices are said to include capital budgeting, budgetary control, profit-center accounting and cost accounting (Granlund and Lukka, 1997). In this study I will not apply too deeply into these practices but instead study how the actual role of management accountants has changed over the years and in the next chapter focus especially on how BI systems have changed the game. As I mentioned the three dimensions of Järvenpää (2001) in the introduction, I mainly focus on the accounting

information systems aspect like databases, data warehouses, ERP and BI systems, and the personal factors. One essential figure for this thesis is lift up from the same research, which demonstrates the manifestation of development trends' challenges and how they emerge from management accountants' role and their competencies. The personal manager type component is left outside of this study thus the onion model has been modified to better fit this thesis and focal point, and can be seen underneath.

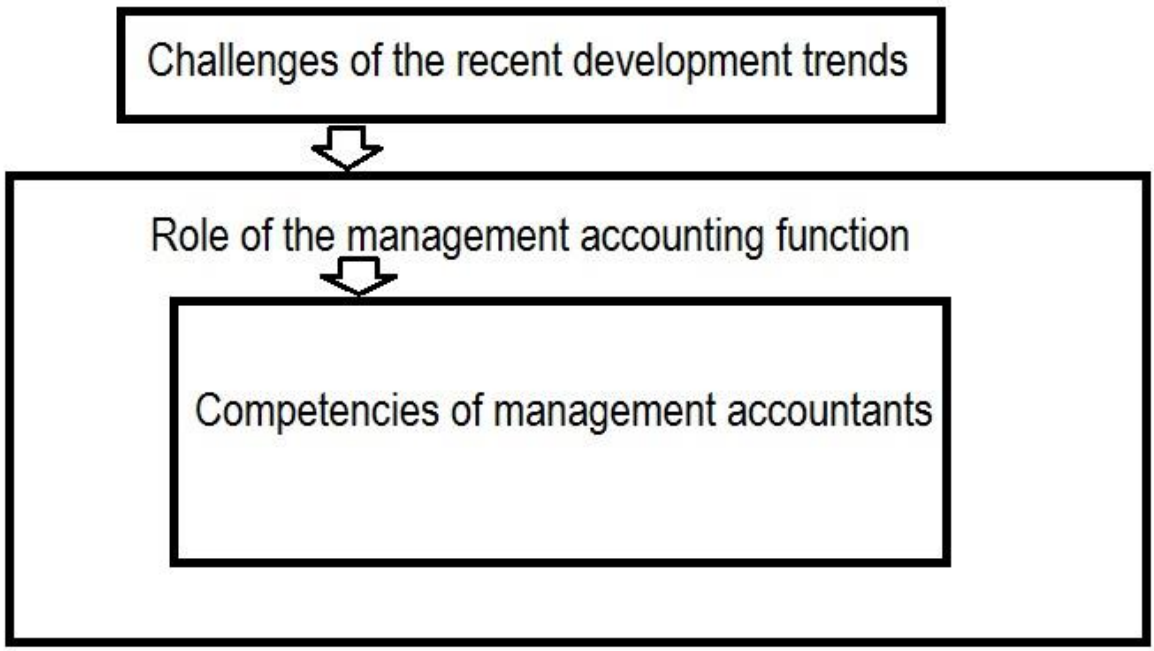

Figure 3:The modified onion model by Järvenpää (2001)

Even though the above figure is quite connected to causality, this research will be more of a descriptive sort, but still it is important to include and analyze at least a bit the cause and effect aspect to better analyze the research question how has BI changed accounting profession? Williams (2004) raises the term modern Management Accounting Information Framework (MAIF), which means a framework that is wider than the traditional cost accounting matters including information about quality, service, assets cycle times and outputs, instead of information just about costs. The idea of that theory is to create a single and comprehensible database for information with the help of for example Business Intelligence and data warehousing. This mentioned environment collects management accounting

information from different transactional information sources, as discussed before in the previous chapter.

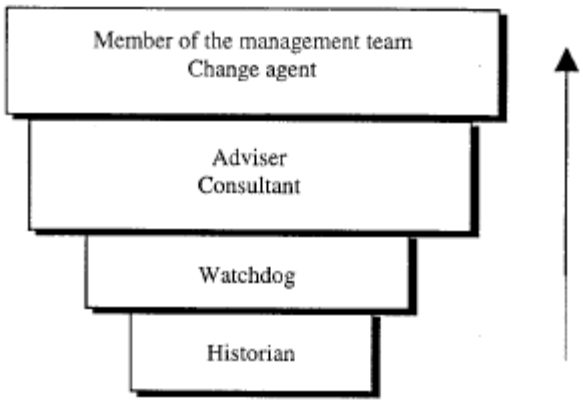

Figure 4: The expansion of the management accountant's job description by Granlund and Lukka (1997, 1998)

Another descriptive figure comes from Granlund and Lukka (1998) where the development of management accountants' role is summed up. Even though the research is almost 20 years old, these changes are still happening. First management accountants were seen as historians, who concentrate on the past and one could say guide by looking at the "rear-view mirror". After that, the role of watchdog was given to management accounting professionals, which meant a bit too controlling and even irritating role, from the views of some organizational members. These approaches were not helpful enough, thus the roles of adviser, consultant, member of the management team and change agent are more relevant and truthful nowadays.

Role theories

One essential research was found that concentrates on role theories. (Goretzki, Strauss and Weber, 2013) "*Roles are, from an institutional perspective, normative phenomena associated with institutional scripts, which are normative guidelines on appropriateness that inform actions and define the constitutive expectations of actors*" (Weber et al., 2013). It means that certain social positions are given to individual actors with the help of goals and activities to define and analyze roles, hence specific actors are performing certain activities. Additionally, definitive roles might be results from repetitive actions and their patterns which will evolve in time after analyzing different social positions, actions and goals, and how they actually belong to some particular group. Nevertheless, changes in roles might happen because of new external institutional frameworks are presented in a company or they are combined to older ones. If

people think about roles as institutions one might say that they "*define social relationships, help define who occupies what position in those relationships and guide interaction by giving actors cognitive frames or sets of meanings to interpret the behavior of others*" (Lawrence and Suddaby, 2006, p. 215). What is also interesting is that actors in organization can try to modify their own role and social status by practicing certain activities and taking specific roles in different social situations and settings. Legitimizing your new role is not always easy, but there are strategies that help with it and for example Reay et al. (2006) argue that activities like "*cultivating opportunities for change, fitting the new role into prevailing systems and proving the value of the new role*" might yield positive results when for example management accountants try to legitimize their modern roles. Moreover, the authors present that professional role changes might need in fact professional role identity transformation, and it is defined as "*relatively stable and enduring constellation of attributes, beliefs, values, motives, and experiences that defines an individual as an insider of a profession"* (Chreim et al., 2007 via Goretzki et al., 2013). This framework can support the institutionalization of new roles for management accounting professionals by legitimizing new roles with the help of re-constructing identities of role owners.

2.2.1 Traditional role of management accountant

Management accountants have been traditionally seen as information providers, and business 'controllers' who have quite objective and independent role compared to modern actors supporting managers in their daily business activities (Scapens et al., 2003). There seems to be a transformation era in the late 1990s, if Finnish management accounting business environment and culture is examined. (Granlund and Lukka, 1997) The article states that fairly accepted fact is that management accounting has been seen as a function which mostly takes care of financial measurement and reporting. This view is over 40 years old but Riistama & Jyrkkiö's (1971) definition is still valid even in the contemporary business world as management accountants are still collecting accounting information and describing company's activities. Moreover, responsibilities include creating reports and calculations about price and volume numbers which will help management and financiers make better business decisions. As I presented the evolution of management accountants' role in the previous section it can be seen nowadays that the role is much more focused on present and future. Instead of the old-fashioned historian and watchdog activities, thus fast reaction time and flexibility is required. If the contemporary period to 30 years ago time period is compared, it can be presented that management accounting tasks were fallen to management accountants, because the function was very

centralized and financial information was owned by management accounting professionals. (Rom and Rohde, 2007) The bean counting activities were separated from factory level and other operational functions which do not seem to be the case anymore (also Friedman and Lyne, 1997).

The old fashioned accounting has been seen quite organized and centralized function and the responsibilities have been related to budgeting, reporting and financial accounting (e.g. Granlund and Lukka, 1997, 1998). Riistama (1971) divides accounting into management accounting and financial accounting, and the thesis will be concentrating more on the first which main goals is to support decision-making of managers and construct systems that enable organizational control (via Granlund and Lukka, 1997). The traditional systems of management accounting were devised by in fact industrial engineers, because their task was to follow resource consumption and check it against planned outputs, hence responsibilities included presenting information about the effectiveness and productivity of processes. (Williams, 2007) This resulted in utilizing management accounting systems for strategic tasks for example investment analysis, financial reporting and pricing. According to Friskoff and Thompson (1994) role of the controller changes a lot between different organizations. Especially the situation might come problematic with family businesses when controllers have to take roles which extend beyond normal tasks. Then controller might have to for example act as intermediator or disciplinarian.

Bean-counter

The bean-counter term is used before the controller role appeared more or less in the 1990s which has turned into metaphor called business partner. (Järvenpää, 2001) The tasks empowered for bean-counters were quite limited in their own department and central activities included generating formal financial reports, financial information analysis, thus these traditional management accountants did not have wide perspective or knowledge about the company's business itself (also Vaivio and Kokko, 2006). Granlund and Lukka (1997) emphasize that the traditional role has been about gathering and handling business information. Same authors are arguing that the biggest transformation has happened in the late 90s, when bean-counters became something much more. Some studies like Vaivio and Kokko's research has examined critically the role of bean-counters, so management accountants, and has it changed during time in Finnish business environment and how can we see the change? It is also argued that the role in history has been too focused on past numbers, or "*in the last digit*" as few of the authors refer to it, of business which measures and focuses on past performance.

(e.g. Granlund and Lukka, 1998; and Vaivio & Kokko, 2006) Unfortunately, this approach is too hanged up on the outdated performance which can harmful for the success of the company if ever-changing business environment is not taken into account. Management accountants have been seen as "*independent technical instrumentalist*" who are kind of silent collectors and processors of accounting information. Granlund & Lukka (1997) suggest that the concept of bean counter means that controllers produce accurate financial reports and records history, and their social instructiveness is very limited to their own accounting function. In addition, Friedman and Lyne (1997) argue how the actual role of bean-counter is probably never going to vanish, but some of the traditional tasks are going to be part of the job description in modern days as well. (via Vaivio and Kokko, 2006) This can be debated, but Vaivio and Kokko also present that management accountants have actually owned a reputation of being "*stunningly boring*" by operational level managers with the role of bean-counter, because of their over focused attitude on precision and form matters. This has ultimately resulted in giving emphasis on irrelevant details, not the important connections to realities of business, thus it might also harm decision-making process. Even though lot of the research has criticized bean-counter role of being old-fashioned, in many centralized organizations these individuals still have important role for creating financial information and analysis (Granlund and Lukka, 1998). In addition, some studies argue that the bean-counter role has to some extent transformed into the direction of business partner, but for example Byrne and Pierce (2007) did not found a strong evidence for it.

Character	'Bean-counter'	Controller
Temporal orientation	Emphasis on the past	Emphasis on the present and the future
Knowledge of the business in which the firm operates	Not expected	Expected
The primary aim of communication	Fulfilling of formal information requirements	Active attention attraction in order to get the message through
Felt scope of responsibility	Narrow; covers the production of correct accounting reports in time	Wide; covers both the production of relevant accounting figures and their application in business decisions
Cross-funtional appreciation	Limited; based often on fear	High for an active and capable person
General operating style	Information collector and processor	A member of the management team and a change agent

Table 1: The typical characteristics of 'Bean-counters' and Controllers compared by Granlund and Lukka (1998)

The above table visualizes comprehensible what kinds of changes have happened from management accountants' bean-counter role towards controller. Studies implicate that the old-fashioned and stereotype role of bean-counter who mainly deals with manual and routine work for example data inputting, recording and reporting has transformed to more value-adding position for decision-making and control. Thus the metaphor could be described as '*business partner'*, which I will be talking about in the next chapter (e.g. Friedman and Lyne, 2001; Granlund and Lukka, 1998; and Goretzki et al., 2013).

2.2.2 New roles

There are several studies that were motivated by management accountant's changing role in organizations and how they have developed through time. Hence it is important to understand; what is the role of management accounting professionals in shifting modern business environment and what kind of competencies they need nowadays? (e.g. Granlund and Lukka,

1998; and Järvepää, 2001) Lot of researchers argue constantly that management accountant's role from watchdog towards more "commercially oriented functioning" is essential topic of studies, because the responsibilities and requirement of management accountants are ever changing. Järvenpää (2001) lists nine management accountants' most essential roles in his study and the most relevant tasks for this research in my opinion are developing accounting system and reporting, producing and analyzing relevant information for decision making, sparring partner for business unit manager and being an essential team member of the management team. Moreover, it seems like management accountants can gain a higher status in their organization if they move from the traditional bean-counter role to controllers. (Granlund and Lukka, 1998) This can be done by taking an active part in different function's organizational discussions and communicating more with members of the organization, thus controllers are seen as a strategic resource. Some IT related tasks have fallen to management accountants and they must be more active in maintenance and managing the IT systems, which have been and still are related fully to the IT people's responsibilities in many companies. (e.g. Caglio, 2003; and Granlund and Malmi, 2002) These controller-type professionals have to have the needed technical know-how and deepen their strategic decision-making, business management and information technology project skills. In addition, management accountants have gotten or taken roles which are related to system design and implementation tasks such as negotiating better deals with system providers, teaching organization members to use new systems and integrating many systems into a working platform. In an institutional level management accountants have to stabilize their new roles as business partner, recreate management accounting professionals' identities and link institutional environment to intra-organizational one in order to actually legitimize the role changes on a broader societal level (Goretzki et al., 2013). What is essential and interesting is that management accountants themselves can influence on their role by being proactive, like choosing to be the leader of big IT investment projects such as ERPS, and in addition it gives them the opportunity to structure the system for the requirements of effective management accounting. (Rom and Rohde, 2007) However this depends fully on the possibility to run these projects, their proactiviveness and choices. Vakalfotis et al. (2011) discuss about the possibilities of ERP systems and how they enable management accounting professionals to analyze information from these systems, designing the information to suitable form and take the role of project manager in software implementation or deal with maintenance of ERP systems. It is quite logical effect that successful ERP implementations transform more the role of management accountants as they usually become business advisors who take kind of proactive steps to support executive level

with their decision making (Saaangster et al., 2009). Management accountants have also received general manager's tasks and maintaining activities that relate to integrated information systems (IIS). (Goretzki et al., 2013) They explain how management accountants are performing non-accounting practices in order to enhance proximity and raise interaction and communication activities between accounting and other functions, thus supporting different level managers. Those empirical findings argue that management accountants are deeply involved in operations and their role has become much more compatible with different organizational cultures, but also the change in their minds has started and management accountants can sometimes see themselves as general management. In Byrne et al. (2007) studies, they found that management accountants have become ever more involved in different projects, like IT deployment, balanced scorecard improvements, relocation decisions and initiatives that relate for example to waste reduction. It is also argued that a change in management accountants' roles will effect positively on management accounting and its practices' effectiveness, thus giving more time for development and implementing some management accounting practice changes (Gullkvist, 2013).

More comprehensive role of management accountants

Some authors argue that management accountants need more business-oriented outlook and involvement in organizational matters. (Järvenpää, 2001) As the article suggests, accounting professionals are evermore connected to all functions of the organization, thus they have become socially more active and participative-oriented. To sum up management accountants need to possess wider and comprehensive set of skills than before, but it might be difficult for companies to find these individuals who have the combination of sufficient accounting, business and communication competencies. Granlund and Lukka (1997) continue that contemporary management accounting professionals need to have a wider toolbox like comprehension of the firm's business, top-notch communication attributes, courage to lead change projects, but still knowledge about financial analysis' principles (e.g. also Scapens and Jazayeri, 2003). Thus it can be seen that management accountants or controllers are holding much wider responsibilities. The authors also argue that in Finland the traditional bean-counter still has a place and has a firm foothold.

Additionally, it is evident that controllers are starting to concentrate more on the external environment and processes than internal ones. Hence lot of cooperation between sales people and management accountants is happening in modern world which is an indicator for expansion of customer orientation to other functions. (Granlund and Lukka, 1998) The Figure 4 was

presented earlier in this thesis, about the extended roles for management accountants as new roles like advisor and consultant have emerged, which according to Granlund and Lukka would be ideal for at least Finnish companies. These same variations with the addition of educator apply for their responsibilities, competencies and attitudes towards change. (Granlund and Malmi, 2002) The role of educator was found especially among senior accountants, who had vast responsibilities for educating within accounting function, but also in some cases they were assigned to teach other organizational members about non-accounting ERP system matters. Olszak and Ziemba (2003) add that management accountants might be assigned to train users for developing their skills to model, identify verify and code knowledge in order to appropriately store, exploit and widen their knowledge.

As it is discussed already, many authors or companies are not ready to give up the traditional controller's role of them being financial watchdogs but executives still want management accountants to support managerial decision-making as well. Granlund and Malmi (2002) explain that partly because of ERPS implementation controllers have more analytical role and more time to perform value-adding tasks which can be related to decision-making process and managerial control. In addition, the changes yearn for better understanding of business, team work skills and especially cross-functional collaboration. Scapens and Jazayeri (2003) argue that routine tasks are decreasing or even eliminated, thus controllers are actually playing a wider role and for example can be seen as business consultants. To sum up management accountants are taking hybrid positions that involve inter alia consulting activities and IIS upkeep, which are additions to the normal management accounting activities and they have the ability to influence on or define their own role. Byrne and Pierce (2007) and Caglio (2003) verify this hybrid role for management accountants, since the role has widened and they are more involved in the business process design.

In Elbashir et al. (2011) studies it was noticed through empirical findings that the reactivity of CFO made implementation more tolerable and he empowered their management accountants to take more analytical and consulting type of role to wide range of different organizational functions. This was succeeded by the mentioned reactivity and fast relevant knowledge and competencies acquisition, thus the CFO played a key role in the implementation phase. Moreover, management accountants' empowerment can yield positive results because they can utilize their knowledge of operational and line functions by leveraging enterprise-wide data for different functional bodies (Caglio, 2003). This acquirement of overlapping knowledge and involvement in organization's strategy development process is happening in other functions as

well, which means more comprehensive roles for other managers or experts as well (e.g. Dechow and Mouritsen, 2005; and Elbashir et al., 2011). Four changes were presented by Scapens and Jazayeri (2003); 1) routine tasks are decreasing thus, the accounting function may be compacted in many organizations 2) accounting knowledge requirements for line managers 3) emphasis on future with new technology which improves the forecasting accuracy 4) and wider knowledge about business itself, because management accountants have probably become permanent actors in different management teams.

Management accountants need to have a more creative role in management teams by integrating "understandings of operating performance, financial results and strategic developments", thus the position of internal consultant or analyst is given to them, because they support manager's operational decisions and they help to create functional strategies (Scapens and Jazayeri, 2003). Caglio (2003) deepens the definition of internal consultant explaining that nowadays management accountants use less time for traditional accounting tasks, but rather they need to understand process technology and products, operations of business, information systems and even strategy and marketing, which gives them the opportunity to advise and support different organizations' members such as line people. Another reason is that less time for data collection is required and the owners of such positions as controller can use their expertise on data interpretation, consultation, decision-making on strategic level, IT initiatives and the management and design process of them, and business management. It is proven that management accountants are actually allowed to serve internal clients of the organization which is due the standardization of practices in a more consistent and high quality manner. Additionally, they have powerful leverage to improve their accountability and consolidate their '*service provider'* role. Expanded role includes also some ad hoc analyses which might incorporate what-if scenarios and cost benefit analyses for the sake of decision support. (Byrne and Pierce, 2007) Furthermore authors describe the role as a guide who helps senior managers to make better decisions by financial analyses to be quite common among organizations, thus the combined control and partnership role is evident. The studies sum up the findings by suggesting that management accountants represent "*a more comprehensive picture of antecedents, characteristics and consequences of the roles of MAs than that identified from prior research*."

Future-orientation and being social

Management accounting has shifted from rear window view to more timely information, which is effected by quicker information flows and this information is also utilized in analyzing future

scenario and cost simulations which can verify the role of management accounting in production development field (Granlund and Malmi, 2002). There is a clear direction towards future in organizations as they want to produce and estimate knowledge about upcoming scenarios thus within the budgetary control companies try to evaluate critical performance measurements e.g. contribution margin, profit, sales and ROI (Return on Investment) (Granlund and Lukka, 1997). In Scapens et al. (2003) the focus of forecasting is explained as "*The more forward-looking emphasis described above represents a change in the way the budget is used, rather than a change in the characteristics of the management accounting information*." Because of this change, management accountants do not need to concentrate on 'ordinary' reports anymore, but they can provide more value-adding information with forward-looking reports and enhance analytical aspects of different business possibilities, which can also be referred as hybridization of management accountants (Sangster et al., 2009; and Caglio, 2003). In addition to future-orientation, when role shifts in roles are thought, companies cannot ignore new competencies that are necessary for management accountants. Modern accounting professional need to have communication and listening skills and in top of that they have to be convincing performers in order to influence to the overall success of companies, hence some authors emphasize the participation-oriented approach for the new role (e.g. Järvenpää, 2001). Vaivio and Kokko (2006) sum up how the modern controller's concept should be understood as "*the socially engaged, less formal contemporary controller seeks a broad understanding about the organization's challenges, communicating regularly, face-to-face, with multiple agents*." Thus as I mentioned before, past-oriented performance evaluation is not enough to harvest the best results for these business controllers. (Granlund and Lukka 1998; and Friedman & Lyne 2001 via Vaivio & Kokko, 2006). Some studies show that management accountants' interaction with other organization's members has resulted in high quality management accounting information and generated an accepting attitude towards it, thus these professionals are questioned more and they have been given a chance to rationalize management accounting information and even the business consequences of it to other members (Byrne and Pierce, 2007). If Finnish business environment is analyzed, it is quite common knowledge and researches validate that Finnish people are generally not the most social nation and small talk is sometimes awkward and strange. (Granlund and Lukka, 1998) If the traditional image of accounting professionals as quiet number crunchers is added, it can be realized that the transformation from bean-counter to socially talented business partner for executive management is quite huge. Granlund and Malmi (2002) raise quite a central question that *"does an integrated information system enhance cross-functional communication within*

organizations and the process perspective in general?" I will try to answer the question and take it into account in the last chapter of literature review. Quite interesting point is raised in the article of Granlund and Lukka (1997) as they discuss about the management accountants' language, which has been seen very complicated and uninteresting. Therefore, management accountants and for example controllers need to modify accounting slang to more appropriate for other functions and members of the company. This will result in more interaction between management accountants and other personnel hence their job description is again more business oriented. Overall what this means as well is that management accountants will be more appreciated individuals of the organization in the eyes of representatives from other functions.

Business-orientation and strategic partner for management

Vaivio and Kokko (2006) present that the professional accounting literature has also mobilized the bean-counter concept explaining that roles for controllers, CFOs and management accountants are expanding towards more strategic direction resulting in more comprehensive and innovative business partnerships for them. Sangster et al. (2009) continue that there is an actual craving for management accountants to be business partners and confidantes so that they can support managers in organizations. Even the managers themselves want management accountants to focus and take more active service role and move out from the traditional bookkeeper one (Hopper, 1980 via Byrne et al., 2007). It is evident that companies with longer history with Information Systems have utilized more the capabilities of these solutions and management accounting professionals have expanded their role to be more active and business-oriented (Granlund and Malmi, 2002). The role change has resulted in management accountant's stronger involvement in management decision making, devising planning and performance management systems, but also redrawing and enforcing the organization's strategy and its goals (Elbashir et al., 2011). Academics like Järvenpää (2001) also found that management accountant's role is transforming towards more business oriented individuals and competencies such as socio-cultural, innovativeness, emotional-moral are emphasized. Controllers are recognized as more like business-oriented professionals who are deeply involved in achieving company's business objectives thus they need to have strong social networking skills. (Vaivio and Kokko, 2006) Moreover controllers are forced to handle and analyze continuously growing amount of information in shorter period of time. The study presents that controller's role has broadened gradually in the direction of change agent which means they take more active role as a progressive business partner for the upper and lower

management. Furthermore, flash reports which are not as detailed and accurate as for example monthly financial reports are seen almost the most useful reports for managerial use. (Granlund and Lukka, 1997) Usually these are ad hoc reports and at least Finnish managers emphasize getting information and these reports quickly and even performance measures' emphasis has in some cases turned into more non-financial information. These issues may concern customer satisfaction, operations and processes quality. The authors emphasize the ever developing roles for management accounting function from watchdog, consultant, and adviser of the management to one of nowadays most important roles for management accountants as member of the management team. In their related studies Granlund and Lukka (1998) see controllers as important participants in formal decision-making, but they also argue that management and financial accounting systems are quite deeply intertwined, thus creating a single integrated entity which can be a subject of a debate. They still feel that management accountants should be permanent members of the management team (also Goretzki et al., 2013). There are also controversial researches about management accountant's involvement in strategic decision making and it is argued that in some cases they should not be seen as equal decision makers compared to operational managers. Instead they should be seen as more like suggestion and recommendation makers, so it can be seen that some ambiguity is revolving around management accountants' role as a business partner (Byrne and Pierce, 2007). However, decentralization has pushed management accounting function towards business itself and its operations. (Granlund & Lukka, 1997) This is happening also in the Finnish business environment as the function of management accounting was focused old-fashionably to the inner processes of organizations, but nowadays they are collaborating much more with marketing, sales and production personnel, thus emphasis is given to external environment. It can be argued that the focal point has turned from process-orientation towards customer one, thus management accountants' tasks are more related to actual business issues.

2.2.3 Reasons for the change

New roles for management accountants are rising from several of reasons and technology is big reason for the change, and I will be discussing more about that in the next chapter and concentrating on other factors in this section. Some studies even suggest that ERP system and other IT implementations have only relatively small effects on control and management accounting procedures (Granlund and Malmi, 2002) thus I feel it is important to study other possible reasons for the role change. Järvenpää (2001) explains that few major reasons for the

role change and new responsibilities are changing modern society and business environment challenges, restructuring of companies, global competition and varying information needs of top management. He states that challenges in recent development trends such as environmental, organizational and cultural have affected widely to the role of management accountants, but also the complexity and team oriented culture have impacted them.

Companies operating in global environment have to be more concentrated on management accounting systems and how to gain competitive advantage from them (Granlund and Lukka, 1997). To define competitive advantage more accurately, Olszak et al. (2003) explain that they arise from two factors which are accessing adequate and reliable information faster and separating important pieces of information to utilize it properly. Thus companies and management level actors need to find potential tools to generate aggregate and distribute valuable knowledge. According to Vaivio and Kokko (2006) in the contemporary world management accountants need to take into consideration shifts in markets and urgencies of the business to achieve competitive advantage and controllers need new skills and characteristics to better confront the strategic challenges of the turbulent present and future. The study speculates that reasons for disappearance of traditional unsocial and formalist bean-counter are partly because of growing competition, need for reliable information and advanced accounting systems entities at least in a Finnish context.

Even before the millennium Granlund and Lukka (1997) studied the reasons why management accounting profession was changing in Finland and it seemed that quite evident reasons for the turn was intense internationalization or one could also refer to it as globalization. As it was mentioned earlier, management accountants themselves have also a crucial role in stabilizing and legitimizing new roles and responsibilities for them, which seemed to be the strongest contributing factor according to empirical findings in Byrne's and Pierce's (2007) research. In addition, management accountants have the possibility to become proactive creators who can benefit from technology because of "*the standardization of practices and languages transcending local contexts, the interfunctionality of information flows and working relationships and the adoption of a process view of organizational activities*" (Caglio, 2003). It can be argued that the deficiencies in management accounting have resulted in a necessary widened functionality and more comprehensible management accounting function's role in organizations (Williams, 2004).

Decentralization

Decentralization has seemed to break barriers and restrictions between different organizational functions which seemed to fit well for the role of controller. Authors like Granlund and Lukka (1997) discuss how the decentralization of management accounting has transformed organizations more into business units and created the roles for business controllers. In their later studies Granlund and Lukka (1998) continue explaining the phenomena that decentralization has impacted greatly to the role of management accountants since they work much closer to operational business processes and personnel, hence the borders of different functions are disappearing and becoming less restricting. One of their main findings was that management accountants' roles are shifting from "*bean-counting to a controller-type of operation*" and the very reason seemed to be decentralization of the management accounting department. The increased visibility of accounting professionals has help with the legitimization of business-oriented role which might also be a result of the decentralization of the management accounting function, since they can offer more support for operational and other managers (Goretzki et al., 2013). Additionally, Scapens et al. (2003) argue that line managers are performing management accountants' tasks and taking their responsibility, because of better usability and comprehensible IT systems and interfaces. This also means that management accounting professionals might be responsible for the systems as these line managers are generating increasingly their own final reports. Furthermore accounting professionals are becoming educators for rest of the organization, teaching managers how to utilize management accounting in their own work in their own areas of activity. The studies' empirical findings also imply that ERP was not a reason for the change, but rather the characteristics such as integration, standardization, routinization and centralization enabled some opportunities to take. Caglio (2003) also argues that traditional role for management accountants is declining because ERP and other IT systems' functionality can be acquired by non-accountants e.g. line managers and information system personnel.

Information overflows and need for integration

It is evident that use of electric communication channels has enhanced information flow and allowed time for more face-to-face interaction for management accountants as well (Granlund and Lukka, 1997). Granlund and Malmi (2002) also state that it is quite common that when massive scale changes happen relating to Information Systems, such matters as accounting logic becomes a subject of re-assessment and changes are plausible. However institutional practices' and organizational routines' transformation usually have to face change resistance

from members of the organization, thus management accounting practices might be left alone, if management accounting practices have quite institutionalized position in an organization (Burns and Scapens, 2000 via Granlund and Malmi, 2002). Authors like Granlund and Malmi explain that complex and turbulent business environment is forcing companies to integration processes in order to gain synergies and effectiveness, so collaboration is required between different functional elements to succeed in creating competitive advantages. The enabler of this change is the acceleration in information flow speed and it is expected or argued to enhance strategic management accounting, which can work as a justification for some IT investments.

Goretzki et al. (2013) believe that management accountants' role change is related to the cooperation of managers and management accounting professionals where the first is transformed into decision-making facilitators promoting their participation in strategy constructing. In addition to information flow speed-up, it is now ever more important to gain access and create value-adding knowledge for strategic or operational purposes and spread this information to authorized users in an organization or relevant business partners. (Azma et al., 2012) This has also resulted in craving for knowledge management and decision-making support processes' integration. Rom and Rohde (2007) continue that ERP systems themselves are not changing management accounting practices, but they can actually facilitate changes in techniques of management accounting. The authors also suspect a bidirectional relationship, but as it was mentioned in the introduction, this assumption is left outside of this study.

Developments in Information Technology has clearly enhanced the opportunities of international operations, because area related systems are being transferred to global databases and they are integrated to corporate IT systems such as ERP and BI (Davenport, 1998 via Dechow et al., 2006). Furthermore, the authors explain that separating data input and information output has become conceivable and it can be accessed any time and any place, thus it is independent from time and space. These advancements might result, and already have, in emergence of virtual teams and working, so new organizational structures and responsibilities can be transformed constantly. The hybrid positions are rising because IT developments such as ERPS but moreover it creates a possibility for management accountants to enhance their position and gaining access to other professional fields (Caglio, 2003).

It is also argued that the opportunities brought by Information Technology will upgrade the management accountants' roles and financial managers as they can become inner consultants and counselors for various managers, but it might also affect in a decrease of accounting and finance functions since line managers can handle their own costs and budgets (Anastas, 1997

via Scapens et al., 2003). Nevertheless, management accountants will still have a role to advise and support the mentioned managers according to Anastas (1997). Byrne and Pierce (2007) sum up the reasons for management accountants' role change which are competitive environment, management expectations, culture, cross-functional interaction, structural arrangements and physical location, introduction of accounting innovations, individual qualities and lastly the technological developments. I will be discussing about the last presented reason in the next chapter special focus on Business Intelligence solutions.

2.3 Impact of Business Intelligence to management accountants' role

This is the last chapter of literature review and in my opinion the most luscious in terms of penetrating new and contemporary areas of accounting research about Business Intelligence and the transformation of management accountants' role. Firstly, I cover some general issues about the matter and highlight the importance of the subject and the fact that the phenomenon is happening right now and how it will come even more relevant for companies in following years. The thesis tries to link previous studies about ERP systems and BI to the changes of management accounting practices and tasks. Matters like automation, effect on traditional management accounting, developments in data quality and required new skills for management accountants are dealt with in this chapter.

According to Rom and Rohde (2006) management accounting techniques and practices have been developing alongside with IT for the last 30 years or so. In their later studies (Rom and Rohde, 2007) the authors are guessing was the first purpose of information systems for accounting function. Even though the bidirectional relationship between management accounting and Information Systems can be argued, it is much more likely that the causality goes from the first to the latter and I will be taking this focus as mentioned earlier (Granlund and Malmi, 2002). Quite relative head note was in Williams (2004) article, which stated that "*Business Intelligence can help management accounting reclaim its relevance and rightful role*" and this represents nicely the focus of this study. Sangster et al. (2009) state that at least ERP implementations are clearly changing management accountant's work and tasks by producing better quality of data and enhancing support for decision-making. However, the benefits or role change, of management accountants, from IT implementations might be realized long after the implementation phase and barriers. (Dechow et al., 2006) The same authors also explain that it cannot be enough that the technology is working, but it is essential

that systems can provide something, thus be useful. Additionally, the definition of Information System is clarified as they explain, that IT (ICT, data processing or databases) only become an Information System, when "*specific meaningful data is stored in the database and it is analyzed via standard queries or dedicated analytical software*".

Enterprise information management systems have been implemented in many organizations, since requirements have arisen from different perspectives such as reporting, transaction management, control and administration (Kahraman et. al, 2011). Prior research explains how the developments of IT have added accounting's versatility and more specifically data warehousing, Application Service Provider (ASP) solutions and internet have been the force behind it. (e.g. Dechow et al., 2006) Some studies suggest that preconditions for management accounting practices' transformation, and getting new management accounting techniques to function properly, have been the integration process for them between information technology (e.g. Hitt and Newing, 1995 via Rom and Rohde, 2006). Thus it is possible nowadays to organize and practice accounting in more flexible and effective way, and moreover automation of routine activities is happening which has facilitated management accountants' role change from bean-counters to proper business analysts (Granlund and Malmi, 2002; Caglio, 2003; and Scapens and Jazayeri, 2003 via Dechow et.al, 2006). In some cases, ERPS and BIS are seen as potential drivers for management accounting's change, but the results are rarely similar to other implementations, because two exactly same kinds of IT projects do not simply exist. Furthermore, the authors discuss how at least ERPS themselves have not effected on Balanced Scorecard (BSC) implementations or functionalities, but other information systems or solutions like Business Intelligence and data warehousing have had a clear impact on them (Granlund and Malmi, 2002).

It is evident that in the industrialized world, implementations of integrated software packages are increasing vastly and the authors' goal was to find implications of these new solutions for the profession of management accounting. (Granlund and Malmi, 2002) So the main finding was that IT solutions have changed the role of management accountants for example by routinizing transaction handling. The authors explain also that the new technology has helped to integrate data and information flows, but these systems should be seen more as vehicles that conceptualize knowledge for expanded social and cultural purposes for instance "*setting standards for appropriate action*".

Rom and Rohde (2006) state that ERP systems can act as powerful tools for integrating transaction processing and organization, and additionally they provide effectiveness to data

collection process and organizational breadth of management accounting. The late adopters, compared to early adapters, are also seen as benefiting more on ERP and BI systems, thus the change of management accountants' role and accounting practices might be greater in these cases. (Gullkvist, 2013) The researcher also argues that despite ERP and BI utilization in operational business is happening, the studies are scarce about ERP and BI systems' effect on management accounting, hence more emphasis on the subject should be steered (Vakalfotis et al., 2011 via Gullkvist, 2013). The same study states that BI solutions might influence greatly on management accounting practices and the effects can be direct or indirect as a precursor of data quality and accountants' tasks which is quite novel finding. Scapens et al. (2003) sum up his studies findings about ERP systems, which may be quite related to BI systems: The elimination of routine jobs, accounting knowledge requirements for line managers, more forward-oriented information and finally expanded role for management accountants. Gullkvist (2013) state that in his studies it was found through empirical research that companies using BI tools have much greater influence on management accounting techniques, and moreover the early adopters receive these benefits in contrary to ERP systems adopters, where it was found out that late adopters usually benefit the most from them.

The amount of data is ever growing and companies need to find a way to tackle the problems with information overflow to produce comprehensible and reliable data to analyze for management accountants and other members. (Vaivio and Kokko, 2006) The authors continue that management accounting data should interact almost flawlessly with tacit knowledge and intuitive elements in order to offer a framework for modern controllers' work and role, even if they would choose to act as more limited bean-counters. The thesis discussed decentralization earlier, but for example Granlund & Lukka (1997) present that one of the opposite trends of decentralization are the possibilities of the modern ADP-technology (Automatic Data Processing) which has brought large data banks and integrated information systems (SAP R/3 to mention one). They argue that these systems might "*lead inevitably to the standardization of data formats and accounting behavior patterns in the production of accounting information*". Granlund and Malmi (2002) explain how organizations are moving towards centralized data processing coordination thus supporting the idea behind centralization. Nevertheless, it is clear that information systems generate new opportunities to harvest valuable data to help with managerial decision making (Granlund and Lukka, 1997). Some researchers state that there are too few studies about practical consequences about Information Systems' impact on management accounting and control, thus my research's motivation and

goals are consistent with prior studies and there is a clear research gap for this topic. (e.g. Granlund and Malmi, 2002) Additionally, they argue that there is deficit of published scientific evidence about implementation projects and especially their impacts on management accounting. The importance of accounting function is emphasized in implementation phases of new technology, where problems with it comes visible for that function more easily, hence accounting department can be referred to as the nerve center of the firm. Scapens and Jazayeri (2003) identified four major drivers for management accounting and accounting professionals' role transformation, which are integration, standardization, routinization and centralization.

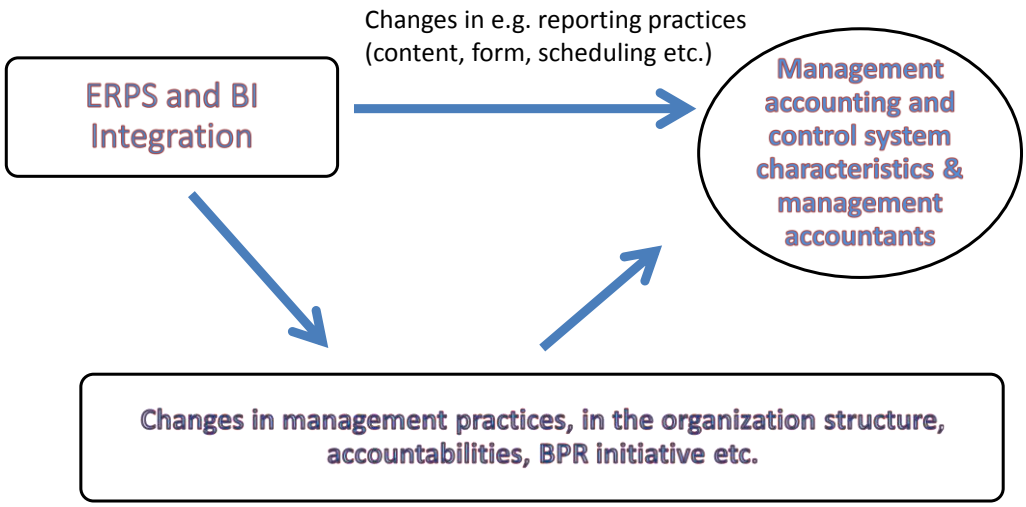

Figure 5: ERPS and BIS as 'change agent' by Granlund and Malmi (2002)

The above figure is modified from the original created by Granlund and Malmi (2002) to fit to this thesis. It helps to understand the interdependence of ERPS and BIS to management accountants' role change and management accounting practices which are often intertwined. The authors argue that these systems have the potential to influence directly and indirectly on management accounting practices. The direct ones are a result from implementations of these new systems and they can have effects to reporting practices (form, content and scheduling) whereas indirect impacts are a cause from altered management practices or business processes which effect to the management accounting itself. Additionally, boundaries between financial

accounting and management one are breaking down and may experience massive changes as the hybridization of these two profiles comes plausible or possible, thus resulting in emerge of double perspective individuals (Caglio, 2003). Many researchers trust that BI and its potential can deliver much richer and widened management accounting information or knowledge, and the realization of this phenomenon started roughly about 10 years ago, because BI can offer affordable tools for "*planning, control, productivity management, pricing and other fundamental management tasks*" and moreover it can influence on substantive management processes which generate economic value. (Williams, 2004) Moreover, now or later in the future, these new technologies can provide utilization opportunities for management accounting purposes and justify their function's or individuals' strategic position in organizations. Data warehousing and BI have the possibility to improve and widen the scope of management accounting systems by delivering "*operationally relevant, industry-specified information about resource utilization, productivity and profit*". The relevance for management accounting could be restored by BI solutions and assuming accounting professionals' key strategic position which is influenced by modern fast-paced global economy.

Granlund (2011) explains that some bold statements have been made about management accounting's transformation towards more knowledge service profession (Byrne and Pierce, 2007) and this should be studied further. Even though I will not be focusing on the success of ERP or BI system implementation, it is still sensible to acknowledge that some studies argue that the role of management accountant may increase after unsuccessful implementations, because it requires more leadership kills in order to cope and they might need to improve the software, but usually time becomes a scarce resource in that point. (Sangster et al., 2009) In the contrary with successful implementation, the role and work duties of management accountants transforms more dramatically as many of their previous activities, for example information collection and provision, are performed by ERP or other systems such as Business Intelligence. Rom and Rohde (2006) add that ERP systems combined to the functionalities of BI systems should enable significant shifts in management accounting for example enhancements in management accounting tasks and better sophisticated accounting techniques can be acquired. Interestingly Scapens and Jazayeri (2003) discuss about the re-engineering of organizations due the introduction of ERP systems, and how it would be actually more sensible to structure the business processes rather than functions, which in turn puts emphasis on

horizontal forms of integration rather than on vertical ones. This may end in focusing on team work and information sharing elements of organizations.

2.3.1 Decrease of manual work and increase of effectiveness

Some of the first objects of information systems was to decrease manual work and automate processes like transaction posting to accounting journals and to sort transactions to different accounts' charts of general ledger, thus these and other changes has also led to more dispersed management accounting activities (Rom and Rohde, 2007). Routine tasks have decreased drastically because of new technology and information systems enabling accounting professionals' access large databases faster, creating more flexible reporting which is better quality and real-time (Järvenpää, 2011). Granlund and Lukka (1997) believed already that integrated accounting information systems will decrease manual reporting routines giving more time to profound analysis and genuine decision making. They continue that in Finnish context, routine activities are considered to take too much of management accountants time and useless basic monthly information is produced, which is not utilized pretty much in any way. Management accountants need to really think what information will produce value and eliminate for example irrelevant performance measures from reports.

Furthermore performance measurement practices' and internal Strategic Business Unit (SBU) reporting' may facilitate shifts in accounting logic due the implementation of ERPS. (Granlund and Malmi, 2002) Their empirical findings indicate that companies want to eliminate or decrease financial accounting and management accounting reporting coordination. This results in a situation where external reporting requirements transform management accounting and its practices. One of the interviewed controllers explained this by stating 'It is truly marvelous that now we can use the spare time left from synchronizing work for more important activities'. Collection of non-financial data is usually slow and it consumes human resources, moreover the problem can be the reliability if these collectors are not motivated or committed enough. (Grandlund and Lukka, 1997) Thus it is important to present how the non-financial measurement results will improve everyday working life. Because data collection of non-financial data is many times so time-consuming, new data collection systems are definitely needed to boost efficiency. Modern controllers and other management accountants seek to decrease time they use for gathering information about financial and management accounting figures (Granlund and Lukka, 1998). However some studies suggest that management accountants' liberation from routine activities because of new technology has not actually resulted in giving them more time for business related decision-making, but IT implementation

projects are consuming accounting professionals' time (Scapens and Jazayeri, 2003 via Byrne and Pierce, 2007). Lot of studies have a different approach and view, since they have seen that as the time passes, management accountants' daily routine work and number-crunching tasks are decreasing and widening capabilities of accounting professionals (e.g. Caglio, 2003; Byrne and Pierce, 2007; Rom and Rohde, 2007; and Goretzki et al., 2013).

The fact that management accountants have to use less and less time for routine tasks is due the automation aspect of for example enhanced Business Intelligence systems and their better functionality. (Granlund and Malmi, 2002) This change might result in more analytical tasks for accounting professionals and even laid offs in organizations, if new roles are not found for them in organizations. Additionally, ERP and BI solutions have directed more emphasis on management accounting processes, growth of internal transactions' automation, more specific information requirement analyses, reports redesigning, and designing more comprehensible interfaces for software. They raise an important question about the matter: "Does the new system allow more time for analysis and lighten the burden of routine reporting?" which should be an objective to figure out in organizations.

Elbashir et al. (2008) states that these IT and BI systems have a habit to automate business processes and inner process connections, and moreover assist with more automated "*decision-making about business conditions, sales, customer demand, product preference and so on*" (Ghazanfari et al., 2011). Modern IT systems have actually enabled automatic book-keeping entries especially at the lowest factory floor level, which has given organizations the opportunity to create more user friendly analyses of budgets e.g. for line managers (Granlund and Malmi, 2002; Quattrone and Hopper, 2005; and Scapens and Jazayeri, 2003 via Dechow et al., 2006). Data gathering and quality of data has improved tremendously because of successful IT implementations thus more effective information processing and decrease of mundane management accounting tasks is a reality for companies (Sangster et al., 2009). Granlund and Malmi (2002) add that one of the biggest advantages brought by new systems is the improvement in processing masses of documents. The authors see the benefits extending in data entries and consolidation work as the data is integrated more easily, since the data is entered only once. If we consider the business aspect, it is possible for management accountants to use less and less time for data preparation and analysis, since for example management reports are generated quite automatically and directly from the BI dashboards and those tools help to analyze different business scenarios at a long and short term sight by utilizing existing data in information systems (Koupaei et al., 2016).

One article suggests that increased simplicity of accounting systems has led to decreasing of manual reports and figures, hence saving management accountant's time for more strategic tasks (Granlund and Lukka, 1998). Elbashir et al. (2011) argue that these enterprise systems should also impact mundane management control system's (MCS) tasks by automating them and creating an opportunity for wider MCS. The success in such projects like ERP or BI systems' implementation has given management accountants additional time for value-adding tasks and the literature suggests that the role for them is much more enriching. (Gullkvist, 2013) Furthermore the research proposes that enhanced effectiveness in management accounting practices facilitates time saving and resources for generating new and more functional practices. Vakalfotis et al. (2011) suggests that changes in routine work are supporting management accounting's exempt resources to help key decision makers with their decisions by more inclusive analyses and interpretation of data.

2.3.2 Traditional management accounting

Granlund and Malmi (2002) suggest that IT has impacted traditional management accounting tools and practices, such as forecasting and budgeting, quite mildly even though through empirical studies some case companies noticed e.g. better accuracy in forecasting and some implemented rolling forecasting because of the new ERP system. Thus the authors argue that not much effect on budgeting has happened but minor shift in forecasting have been demonstrated, but this was back in the beginning of the millennium, thus wider transformations have happened after that time. The research is also quite controversial to other studies since it suggests that management accounting tasks have not been transferred to non-accountants, which does not seem to be the case as the thesis presented earlier for example in the chapter 2.2.2 about new roles of management accountants. Additionally, budgeting seems to be supported by business planning and simulation modules which should be user-friendly towards for example Microsoft Excel, and in some cases the user interface might be developed from requirements of that software (Rom and Rohde, 2006). Vakalfotis et al. (2013) suggests that ERPS have the ability to raise many traditional management accounting practices such as standard costing, variance analyses, marginal costing and breakeven analysis, but it is yet to see how BI solutions effect on use of these practices. It is quite complex trying to see or analyze similar or different kind of effects from ERP systems compared to BI ones, and some of the findings might be generalized to work in a same way with both of those systems. For example Granlund and Malmi (2002) state quite strongly that ERPS would not have much impact on traditional management accounting such as budgeting, even though many of their case

companies were using budgeting inside those systems. This thesis still tries to find specific Business Intelligence effects on management accounting even though it is not that widely studied area.

Researchers question that has ERP and other Information systems effected to the use of Activity-based Costing (ABC), since those solutions are in many cases built in to the new systems quite standardly for analyzing costing issues (e.g. Granlund and Malmi, 2002). Business Intelligence might create possibilities to produce business trend relating analyses and reports on internal matters of the organization, because those reports and analyses can be generated more systematically and regularly, or even ad-hoc if needed to support specific business decision-making (Jalonen and Lönnqvist, 2009 via Ghazanfari et al., 2011).

The new technology and ERP systems especially can be the solutions for companies to create Balanced Scorecard solutions, because they offer easier and quicker access to operational data, which is usually standardized. (Granlund and Malmi, 2002) In their empirical studies few interviewees stated that: '*We are probably going to build the BSC into the ERPS, if it will allow it*'. However, ERPS themselves offer seldom the complete information and data, but it has to be collected from various sources and Business Intelligence solutions are likely to support this phenomenon. Back in the early 2000 there seemed not to be appropriate solutions for this transformation, thus BSC was often left outside the ERP system and the impacts were moderate. Rom and Rohde (2006) discuss how the strategy management module helps to visualize and utilize the balanced scorecard's functionality by for example generating related strategy maps. They continue or support Granlund's and Malmi's findings by stating that performance management systems such as BSC are usually implemented outside of ERP systems, but it will be still be seen that does Business Intelligence offer solutions for this dilemma. One interesting finding comes from Malmi (2001) research where they state that organizations who are trying to adopt BSC are preferring collecting data manually, even though automation element is usually the most viable option (via Rom and Rohde, 2007). He continues that those BSC solutions are maintained in spreadsheet that are separated from the ERP or in specialized software. Olszak et al. (2003) state that Business Intelligence itself seems to complement BSC solutions and it should be quite easily implemented or connected together, since it "*facilitates a multidimensional overview of an enterprise*". Thus companies can analyze the BSC dimensions, which are financial, customer, internal processes, and development and growth (Kaplan and Norton, 1996 via Oslzak et. al, 2003). Rom and Rohde (2007) discuss how

the modern BSC implementations are exploiting BI systems capabilities to integrate data, which usually comes from different databases such as ERP.

Management control and enhanced quality of information

Dechow et al. (2006) suggest that essential matters could be learned about management accounting and control, if authors and organizations would analyze and study the relationship between information technology and above mentioned issues. What makes it difficult is the complexity and problematic nature of the relationship, because information technology can be a challenge and a resource at the same time for organizations and management control, and moreover the causality might be tricky since IT cannot work on it own. Widening the horizon of business orientation in management accounting some authors suggests that managerial philosophies are changing which affects management control for example in terms of empowerment and team management (Granlund and Lukka, 1998; and Järvenpää, 2001). This area has clearly a deficit of studies, since organizational and behavioral elements of IT and consequences to management control implications have left without sufficient and necessary attention. (Malmi and Granlund, 2002) This may be due the moderate effects of ERPS on existing control systems, but then again BI has the opportunity to change this as well. The authors explain that "the accountabilities and control in organizations may change due to the impact of ERPS on organizational structure or the division of tasks between the units", thus even though some changes may feel minor there is a clear effect on for example organization autonomy and responsibilities of management accountants. Evidently the knowledge of management control processes, system design, mobilization and use of those MCS has to be further studied in various organization environments (Dechow et al., 2006).

Business Intelligence capabilities are using analytics and performance management elements in order to leverage different databases and information systems to creating key management control systems. (Elbashir et al., 2011) They continue that companies have been unable to exploit modern information and control systems' new capabilities in their advantage, instead they usually only support the existing ones. However BI seems to provide essential business analytics and performance management reporting features to support acquiring fundamental information and knowledge which can be utilized in MCS and additionally new innovations are not only designed for single aspects of control for example ABC or BSC. The features yield benefits like widening planning and cybernetic controls, and at the same time helping with compensation and administrative controls. This expansion improves strategic and also operational level analyses, which in turn supports decision-making (Dechow et al., 2006;

Quattrone and Hopper, 2005 via Elbashir et al., 2011). Still it has to be acknowledged that simply implementing these enterprise systems do not provide massive improvements for MCS capabilities (Elbashir et al., 2011). In addition with the help of BI, companies are developing more functional MC systems which offer the needed strategic aspect of value chain activities for product development, sales and marketing, customer and performance management (Davila and Foster, 2005 and 2007 via Elbashir et al., 2011). Some studies are focusing on the 'invisible' aspects of MCS and how organization's members mobilize new technology in their everyday work routines and operations, and it might impact on formal and informal management control (Scapens and Jazayeri, 2003; Dechow and Mouritsen, 2005; Quattrone and Hopper, 2005 via Granlund, 2011). Granlund argues that the relationship and independencies of management control and contemporary information is still underdeveloped in terms of empirical and theoretical findings, and results, which are complex and may be directed to unexpected areas. Elbashir et al. (2011) explained how BI solutions are able to automate MCS features and they should be aligned with business strategies, and the combination is functional if management accountants have the required skills and knowledge, which will be the subject of the next and last chapter of literature review.

2.3.3 New skills required

Changes in management accounting and accounting professionals' roles have and will still impact on preferred skill set of controllers and similar actors (e.g. Granlund and Lukka, 1997, 1998; Järvenpää, 2001; Vaivio and Kokko, 2006; and Byrne and Pierce, 2007). Vaivio and Kokko suggest that modern controllers need to have more interpersonal competencies, abilities to argument their views and pro-active management style. However acquiring these new skills does not erase the fact that they still require quite comprehensive set of accounting skills, both financial and management ones (Granlund and Malmi, 2002 via Dechow et al., 2006). Additionally these individuals should have action-centered and analytical skills where the first ones are used more by lower level managers and the latter by higher level when evaluating financial figures of several different projects (van der Veeken and Wouters, 2002 via Rom and Rohde, 2007).

The thesis already presented different roles such as consultant for modern management accountants, thus they need to work effectively as internal consultants and moreover they need consulting skills such as communication and interpersonal, and wider business knowledge compared to the old bean-counter and record-keeping role. (Scapens et al., 2003; and Caglio, 2003) The authors add that management accountants need to possess and develop these new

skills as they kind of become a sales and change agents rather than watchdogs of the past, hence they have the ability to convince others with their ideas and make them a reality (Anastas, 1997 via Scapens et al., 2003). The communication skills can be seen important when management accountants are interacting with different level managers who have varying ideas and backgrounds, because they have to take expanded view of the company's business and be capable of connecting financial and cost information to the strategic aspects and developments of the business (Scapens et al., 2003). Other researchers and surveys (Siegel, 1996; and Burns and Yazdifar, 2001 via Byrne and Pierce, 2007) verify these findings by stating that management accountant's roles have been broadening for a while and those studies emphasize analytical and social skills. However for example Parker's (2002) empirical findings are suggesting that capabilities, which are often joined to business partner role, strategic thinking, commercial awareness and decision-making seemed to be conspicuous by its absence (Via Byrne and Pierce, 2007).

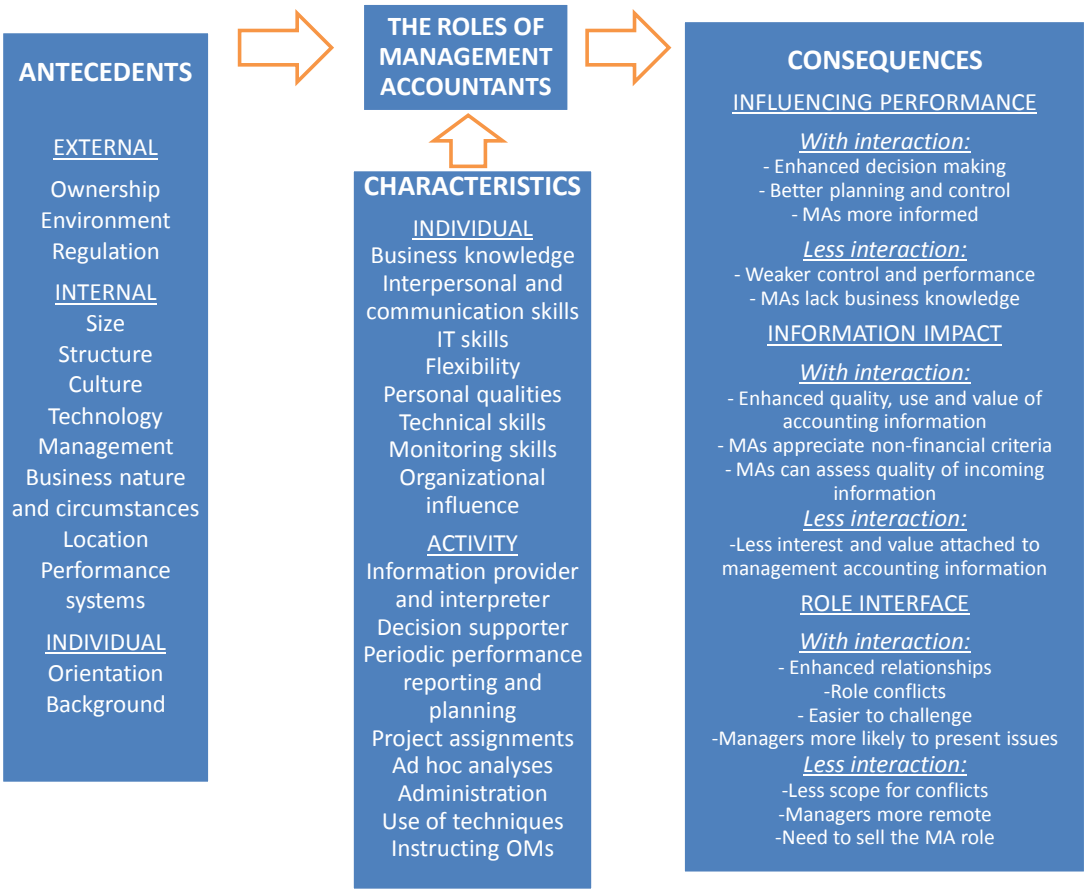

Figure 6:Antecedents, characteristics and consequences associated with the roles of MAs by Byrne and Pierce (2007)

The above Figure 6 sums up lot of the required or expected characteristics from management accountants and deals with the effect of antecedents to roles, and moreover what might me the consequences. The authors found "*strong support to particular attributes being sought by role senders for the roles of management accountants*" such as approachability, commercial awareness, team and communication skills, and flexibility. In addition the findings indicate that these modern management accountants require strong characters and they might be referred to as 'strong controllers'. Scapens et al. (2003) further explain how many individual characteristics such as business knowledge, the earlier mentioned interpersonal and communication skills, monitoring, organizational influence, IT and technical skills, and adaptability are all important and features of modern management accountants. Vakalfotis et al. (2013) add and suggest that management accounting professionals should have key skills like "*IT competencies, cross functional working relationships, and analytical and consulting abilities*", so they can remain indispensable for organizations.

3 Methodology

This chapter concentrates on presenting the chosen research methods and what were the reasons for the choice and also what are the benefits compared to other methods. The chosen method was field study and I decided to construct a qualitative research with 8 semi-structured interviews. Interviewees were from different field of business and they had varied amount of experience from management accounting or Business Intelligence solutions. All of them had experience from management accounting and few of them were working for a service provider company offering BI solutions. The goal of this chapter is to offer proper justifications for the chosen method and evaluating the validity and quality of this research. Proper actions were taken before the choice of appropriate research method and this will be discussed as the research design process of my thesis. Additionally, the research question(s) and objectives are aligned with the chosen method, which was a major selection criterion for it. The empirical research matters, such as interviews, chosen interviewees and interview questions are also validated and analyzed in this chapter. A great help for choosing the method was also Lillis and Mundy's (2005) research about field study and its advantages, which also states that this particular method should be used more for management accounting researches. This study's approach is quite descriptive, so I will not be giving strong recommendations or guidelines for

companies, how to deal with their management accountants' developing roles or Business Intelligence issues, hence empirical research is carried out explaining what were observed in the field or mainly from the interviews.

3.1 Choosing an appropriate research method

Lot of management accounting tasks researches which are related to Integrated Information Systems (IIS) are usually or at least in many cases studied with survey method. (Rom and Rohde, 2007) The authors argue that studies in this area have often constructed their research from an interpretive point of view or stance. Additionally, Gullkvist (2013) states that quite limited amount of empirical studies have given the attention required for management accounting and information technology's qualitative or quantitative research approaches. Sobh and Perry (2006) mention that recognizing the research paradigm, which can be understood as "the basic belief system or worldview that guides the investigator" is one of the most important tasks for the author, and not all the attention should revolve around choosing from qualitative and quantitative methodology, since it is only one-third of paradigm's elements and the other are ontology and epistemology. In addition, positivism, constructivism, critical theory and realism are the four paradigms of research. These issues deal with the knowledge creation dimension where individuals should analyze the research's generalizability. For example, in realism research the authors advise to first get to know relevant literature, then conclude first interviews and continue reading, thus simultaneously multitasking with empirical and theoretical research, because then the academic findings can be tied to empirical ones more easily. This process is quite close to my own research process and design. Ahrens et al. (1998) claims that some field of researches like management accounting has not been tied enough to the real world, so empirical researches should be expanded to include organizational experiences.

The objectives of the research and the research questions should be quite well aligned with the chosen method, since objectives were to demonstrate the topicality in empirical world, but support this statement with theoretical findings which were discussed in the literature review. Atkinson et al. (1998) even state that research question(s) and hypothesis can guide the investigator in a direction for observation, thus these two are also intertwined and researcher himself have to figure out or decide what he/she thinks is important. It is essential to create initial hypothesis, which can also be referred as working hypothesis, and this approach is also acknowledged in this thesis, because it can be seen as a driver for field studies. (Atkinson and

Shiffer, 1998) The authors state that in field study method researchers should constantly check their initial expectations when new data is collected or analyzed, and change it if necessary, but they should also remember that the key emphasis is on theory creation. Some scholars suggest that there is a deficit of required researches of this subject, and theories and empirical findings about role changes are supported in the chosen field study since it has emphasis on comparative analysis. (Lillis and Mundy, 2005) The research also implies that in management accounting lot of overlapping research issues are justified by authors of their own methods, but there still remains lot of uncertainties and ambiguities in each research stream, because productive dialogue is missing. For example, authors who use surveys are often criticized for the deficit of deeper insights to uncertain or conflicting findings. Otley (2001) suggests that management accounting researches may be left with a "sense of ad hoc and inconsistent findings" because the practices related to that branch of science can be quite unstable and changeable over time. Instead case studies can be seen popular when trying to explain management accounting in organizational context, but as one might guess, these findings are rarely generalizable (Lillis and Mundy, 2005). Otley (2011) explains that problems might also arise, because social phenomena are difficult to study scientifically and this should be acknowledged when designing the research and deciding on appropriate method. If case studies (multiple), surveys and field-study are compared, lot of differences can be recognized but they should not be only analyzed by number and depth of observations since there is lot of variation in design logic of the researches. (Lillis and Mundy, 2005) The design logic is impacted by complexity of the subject which is studied and the urge to observe and constructing patterns across cases. If surveys and case-methods are further compared, it is evident that the first ones rely heavily on amount of data to make statistical generalizations from the chosen sample size, whereas the latter want to make theoretical generalizations by "*employing purposeful sampling in order to obtain information-rich cases"* (Ying, 1994 via Lillis and Mundy, 2005), thus goals are different in different methods and should not be compared in single dimension.

Field studies have the ability to bring theory to life with real life organizational examples, and sometimes even refute existing theory or state new theories in positive way (Ahrens et al., 1998). Lillis and Mundy (2005) are demonstrating that field study fits well, when the subject should be promoted for productive dialogue, which can be field-based, and complexity and difficult interrelationships are involved to the subject studied. The authors feel that cross-sectional field study has been underexploited for a while and the method should be used more often for management accounting research's purposes. This method is utilized when exploring

new research areas and offer preliminary input to surveys, because after those studies the subject can be evaluated or studied in greater breadth (e.g. Otley and Berry, 1994 via Lillis and Mundy, 2005). One benefit of this method compared to case studies, is that it can detect cross-case similarities or even patterns in specific issues which may be "*otherwise embedded in detailed case write-ups*" (Lillis and Mundy, 2005). Merchant and Manzoni (1989) were one of the first ones to introduce and use field study, and the original idea was to bridge the gulfs between survey and case-based research methods by taking characteristics from both, such as wider breadth attributes from the first method, and depth features from the latter, in order to fulfill some management accounting's research gaps. In addition, the method can capture internal and external validity, which is seldom possible for survey or a single case study. The researchers designed their study and its domain to fit to a narrow frame and defined it clearly, which helped them to restrict the complexity of the phenomenon, and moreover offered outputs such as theory refinement from limited contact with individual respondents (Merchant and Manzoni, 1989 via Lillis and Mundy, 2005). The method may be preferred compared to surveys because it is relatively easy to do research with specifically defined views or aspects of management accounting in organic organizational contexts (Lillis and Mundy, 2005). Some studies suggest that field study can offer richer descriptions of accounting in action, which is one of the biggest motivation factors for using this method and the use of it in empirical studies has been too scarce. (Ahrens et al., 1998) They also state that there is lot of potential in field research as it has to possibility to offer rich accounts to even complex interconnections between functional accounting and organizational context

3.2 Field study

There are different applications and benefits for field study and I will be discussing those in this chapter. The method can be for example used for testing hypotheses of the research as Elbashir et al. (2011) did in their studies and moreover Merchant and Manzoni (1989) illustrated to usability really well in their cross-sectional field studies about budget target achievability, thus demonstrating the possibilities of the method how to contribute to the management accounting academic literature quite significant insights. These kind of studies usually start by obtaining strong theoretical foundations and quite narrow domains, but furthermore they usually identify uncertainties in definitions, measurements or relationships of matters. (Lillis and Mundy, 2005) As discussed earlier field studies are positioned somewhere between broad-based surveys and in-depth cases, bringing benefits but also shortages from

those methods and possibility for "*non-random selection of field sites*". There exist several mainstream research examples of field study method's use (e.g. Bruns and McKinnon, 1993; and Abernethy and Lillis, 1995), however the method is a bit uncommon but not considered as unconventional (Arnold, 1970 via Lillis and Mundy, 2005). Lillis and Mundy also argue that this method works well when trying to detect or document variations in interpretations for example in variables like activity-based costing and dimensions of balanced scorecard. What also seems quite usual is that field study researchers collect data that relates to the subject, but they do not offer a massive contribution for constructing definitions, measurements or interrelationships. The authors add that these studies have the opportunity to contribute to solving inherent contradictions that have risen from management accounting research findings, hence they can clarify the essential empirical phenomena that are presented by the constructs used and furthermore document the social context in which the constructs interact to create organizational outcomes. The field study can be a channel for organizational attributes and events to be connected to each other, which highlight the impact and even role of individuals in the process, so the method is demonstrating a "*capacity to identify*" (Lillis and Mundy, 2005). Some authors recognize distinctions and relationships between technical and organizational approaches or aspects, but those are not always explicit and many studies have a clear focus on one or the other. (Ahrens and Dent, 1998) The researchers also state that some studies might emphasize accounting techniques whereas the other might be more interested in organization dimensions which are influencing on the background. Furthermore, the method can be a tool to capture complicated phenomena within in advance restricted domain and gives the researchers an opportunity to analyze reasons that might rise from conflicting results, tensions and ambiguities in previous studies. (Lillis and Mundy, 2005) It is also highlighted that forming the research question(s) is an important phase of field studies, so these two support each other.

Atkinson and Shaffir (1998) recognized three essential steps in field studies which are behavior observing, summarizing them and reporting about the results, and additionally management accounting research emphasizes the dimension of how individuals or groups react to management accounting information. The purpose of field study is often related to significant extant theory, which still includes doubts or disagreements about "*the nature of the constructs on which the theory is built, the relations among these constructs, or their empirical interpretations*" hence the objects have often something to do with theory refinement with the help of enhancing theoretical concepts' accuracy through clear statements (Keating, 1995 via

Lillis and Mundy, 2005). This method is also a reasonable way to obtain large amount of observations, better than in-depth case research, but the approach also can handle more complex 'how' and 'why' questions than survey method ever could (Ahrens and Dent, 1998 via Lillis and Mundy, 2005). Field study can be seen extremely useful when establishing theory that relates to the phenomenon, but prior researches have not been able to capture the essential empirical aspects of the phenomena (Lillis and Mundy, 2005) and moreover it creates opportunity for real life managers to really understand management accounting and the contextual occurrence (Keating, 1995). Ahrens and Dent (1998) continue that this method can yield data and observations that might be "suggestive of theme and counterpoint, of interpretations and counter-interpretations", highlighting different voices around accounting in companies, thus making it nuanced. However, it must be understood that researches use this method due varying motivational reasons and they adopt different kind of research designs, hence it can be for example concluded to describe technical practices, deepen the understanding of accounting as a technique or emphasize the interrelationships between accounting and management or even organizational processes. This approach includes steps like getting closer to individuals, observing how they act on different situations, identifying their obstacles or problems and analyzing the practices how they deal with them. (Atkinson and Shaffir, 1998) According to these scholars, one benefit of this method is the opportunity to promote construct validity, but moreover often the main objective for management accounting field studies is to test a certain theory which has been tested in other settings or develop a new theory.

There are also weaknesses with field study approach and those may be related to finding clear linkages between empirical findings and theory itself, and one might consider it as "a missed opportunity to refine the theoretical basis for empirical research in management accounting more generally". (Lillis and Mundy, 2005) However, those obstacles can be overcome if the research studies and validates social constructs and relationships better and with cross-sectional approach, thus improving the research's goals of becoming more credible and generalizable for field-based theory refinement. Atkinson and Shiffer (1998) explain how the generalization is much more subtle in field research and the purpose is often to understand "behavior where someone else has left off". Another pitfall might be the unclear research instruments or data gathering process, which effects on creating explicit definitions or theoretical backgrounds (Ahrens and Dent, 1998 via Lillis and Mundy, 2005). Three themes are rising inside this method, where the first one deals with trade-offs of creating deeper understanding of some social or organizational setting, and moreover the advantage of comparative evaluation and

replication element. (Ahrens and Dent, 1998) The second one concerns the process of theorizing, so constructing empirical findings into field patterns, and the third theme is the "*issue of imposing prior theoretical constructs on the materials to be found on the field*" (Dyer and Wilkins, 1991 via Ahrens and Dent, 1998). The author has to consider and taken into account the vast amount of possible data gathered in field study, thus avoiding the "drowning in the data" incident and providing as good patterns, and synthesized and repetitive observations about the themes. (Ahrens and Dent, 1998) Furthermore the goal is to figure out those patterns and improve theory by iterating between field materials and insights, hence the findings should not be only the product of the researcher's creative mind and imagination. Important phase of filed study is also to demonstrate how data connects to theory, and can be traced adequately which helps to separate author's own voice and opinions from "participants' literal unedited speech statements". Ahrens and Dent argue that field study process should be organized with three overlapping activities that are ensuring details, generating patterns and writing. For the writers themselves, is important that they possess interpersonal and sensitivity skills in the interview process, so the interviewees have a feeling of speaking freely and even "off the record" despite the fact that the researcher is recording the interview and taking notes. Moreover it is vital in the interview phase that the researcher is capable enough to direct interviewees towards avoided and tough issues. This helps to create or analyze knowledge, which cannot be yet found in libraries or other scholars' studies, but then again it can be quite intimate, time consuming and difficult. Even though comprehensive pattern making is not a main object of this thesis, I will try to take into account different interviewees' varying opinions or perspectives and generate findings that fit and relate to each other, so these views have the ability to generate some kind of consistent conclusions which explain the outcomes that I have observed. Despite all of the appraising arguments that complement field study approach, the author realizes that creating a unique story is very rare and usually the data is only analyzed in various ways and differing themes are drown out. However the method is useful for creating more comprehensible knowledge and understanding of management accounting functions in practice, thus the complex real world of organizations can be guided towards and closer to the reader.

3.3 Research design

Research design can be understood as the logic that intertwines the collected data to the initial research questions hence it means the strategy that guides the steps to generate a well-structured research (Yin, 2003). For my own thesis the mainly qualitative approach seemed to fit well with the research questions and objectives, since I am trying to demonstrate that the phenomena, of management accountants' role changes due technological innovations, is not studied enough and that it is very topical in organizations. Lot of academic studies have the tendency, or should have, to identify distinct research questions and narrow domain of the subject which can be related to broader area of studies or target achievability (e.g. Merchant and Manzoni, 1989; Abernethy and Lillis, 1995 via Lillis and Mundy, 2005). In their own studies Lillis and Mundy (2005) tried to emphasize cross-sectional field studies' design characteristics with the help of connecting the rationale with complex phenomenon that was studied, "sampling logic, instrument design and data analysis protocol". Sometimes authors might have to justify their design of the research which can be done for example by demonstrating the relevance of research questions to handle multifaceted instruments, ambiguous constructs and structural forms. As it has been discussed earlier, this thesis was at least attempted to have a comparative approach towards the phenomena from theoretic and empirical point of view, because one of the aims was to obtain interesting, meaningful and diverse data which could be compared to other findings (Lillis and Mundy, 2005). The interviews

Different issues have to been taken into account when planning and executing a field study, and one of them is the sample group and the size of it. Ahrens and Dent (1998) state that there are two kind of extremes concerning concluding empirical studies, where in the first the author can concentrate on a single organization and the second harvest lot of interviews and sample sizes. In my own thesis, I decided to interview five to ten management accountants or Business Intelligence service providers, which can be in different life-cycle stages, and from small start-up companies to international corporations, in order to receive many-sided interviews and findings. When deciding and selecting about the sample size and focus, one must truly think about what are the objectives for this certain research, hence Ahrens and Dent point out that goals vary with different sample size researches. Byrne and Pierce (2007) add that their key criteria for choosing companies to interview, was that the subject organization had a separate management accounting function and other ones as well. My selected companies to interview might not have separate management accounting function per se, but in every one

of them management accounting and those professionals have important role in the organization. Webb (1981) offer some pointers how to gather reliable data for field study by presenting techniques in qualitative research such as semi-structured interview, life histories, document analysis and nonreactive measures (via Atkinson and Shaffir, 1998). This thesis uses actually only semi-structured interviews and interviewers own observations from them, since those tools seemed to be fitting well with my thesis' goals. Those interviews have the ability to have quite in-depth findings and keep the discussion more freely, which usually helps interviewees to relax and feel more comfort to talk even about the difficult and bad subjects or incidents. Lillis and Mundy (2005) explain the concept quite comprehensible by stating that those "*semi-structured interview protocols are used to constrain the data collection within a tightly defined domain while ensuring that comprehensive, comparative, narrative data are collected across a range of sites*".

The selection of every single interviewee, based on the presumption of those individuals who have the possibility to create theoretical insights, is also essential for the selection process. (Atkinson and Shaffir, 1998) The same studies presented different kind of roles for researchers and the closest to mine is the complete observer, since I do not have any authority to effect interviewees decision making and I am not taking part on companies' social processes. To talk more about the selection process of interviewees and companies, I tried to find quite versatile sample of them, thus some were controllers who have two to five years experience, some longer about 10 to even 40 years' experience. The differences and summary of interviewee information is presented in the Appendix 1.

The companies might have been selected quite randomly and the author knew personally only about half of the interviewees, even though own personal network was utilized in the choosing process. In the end I am very satisfied from the interviewees but even more from the successful interviews and findings which were possible to make because of these individuals and their thoughts. The pre-mentioned length of interviews was said to be 45 minutes plus small talks, and it came through in almost all of them, except in the ones where the interviewee was acting in two roles; management accountant professional and BI service provider. All the interviews were recorded on a mobile device and I made notes during them, so later on when transcribing them I already knew which parts were relevant for my studies and included them to the transcripts. The author also gave the interviewees a possibility for total anonymity and even withdraws their statements if they were not satisfied in the sent transcript, for confirmation purposes, which luckily did not happen since it could harm the validity of this thesis. I will be

discussing about the empirical findings and analysis of them, and how they relate to prior studies and theories in the last part of next chapter. As Lillis and Mundy (2005) state, it is vital to demonstrate a critical link between empirical observations and theory, which is achieved for example with analytical protocol. Moreover, to strengthen the credibility of the research, one has to have systematic form of analysis and sense of completeness in the research by having rigor evaluation of significant findings in the data, thus readers feel that the studies are disciplined and reliable. Because of all the interviews transcripts, documents and other data, the researcher has an audit trail through data which should enhance the credibility.

3.4 Quality of research

In Atkinson and Shaffir's (1998) opinion, researchers have to remember that they cannot observe everything, because that would be overwhelming for the process. This also means that the findings or conclusions usually in field study method cannot be statistically or otherwise generalizable (Lillis and Mundy, 2005), but it is not a desired objective for my thesis either. Yin (2003) adds that case studies quality can be evaluated with four constructs which are validity, internal validity, external validity and reliability. The validity means that the research needs to establish correct operational measures for the subject or concept which is being researched. Instead internal validity refers to studies that deal with causality, and external validity means verifying "the domain to which a study's findings can be generalized". Additionally reliability concerns the fact that can the study be repeated with similar kind of results as the original one. Another factor which is actually rarely discussed in business research is the research ethics which refers to for example different ways of quoting other researchers and scholars, and how the research is reported and conducted. (Eriksson and Kovalainen, 2008) This is a clear deficit in these kinds of researches because ethics has usually a definite impact in empirical studies. Moreover the authors emphasize the relationship between researcher and participant or interviewee is essential, but it should not only extend to data collection but for the whole research process. Authors should take into account that interviewees are participating with free will, material is handled with confidentiality and give the interviewees a possibility to stay anonymous. In my research it helps with the validity and quality of the research that the thesis is not an assignment for some company, thus I do not need to have certain kind of research findings or results, but I can keep my integrity and reliability. Atkinson and Shiffer (1998) also highlight the critical tests of reliability and

validity, which have to be ensured to the possible extend when assessing the findings and conclusions.

Lillis and Mundy (2005) state that cross-sectional field studies are underexploited and the findings have the opportunity to be reliable and theory refinement credible, with high construct internal and external validity. This refinement of theory can be reached with combination of "field-based, contextual, social treatment of management accounting with the science of cross-sectional replication". Additionally cross-case patterns can enhance readers' trust in broad relevance of these issues or factors, and construct validity can be increased with qualitative insights to reach richer definitions of constructs. Conscious choice to limit the depth of the research has to ability to let authors focus more on the contextual fundamentals that can be thought as the emphasis or priority number one of interest. This helps to concentrate on understanding the phenomenon which can be quite complex. However one factor that has to be acknowledged in field study method is the collection of data by semi-structured interviews, because some argue that those can lack randomness and generalizability, thus limiting the breadth and reliability of the research. This problem or trade-off with depth and breadth can usually be overcome by really figuring out or analyzing the most suitable research questions that fit for broad-based comparative field studies.

I have to also try to notice, if I as a researcher start to be bias when collecting data from the interviews, but this is only a matter that I have to acknowledge, so the research's validity stays in an appropriate level. However it is a fact that individual values and the way researcher filters the observations in the world is effecting his or hers views, thus it is important to develop standards for communicating field research findings and specifying the perspective of the author, so readers can notice or understand what kind of biases the researcher might have and how it has affected the research process. (Atkinson and Shaffir, 1998) They add that it is important that some evidences are provided in other studies about the phenomena with similar behavior where the same author was not present, and the complication of the researcher being unduly biased has to be addressed somehow. Again even this obstacle is manageable, because field studies try to find patterns across different sites, so single interviews do not have massive influence on findings or conclusions of the research (Lillis and Mundy, 2005). The neutrality and objectivity are issues that need attention in qualitative studies, but they occur also in all forms of researches and this fact is often overlooked when quantitative researchers criticize qualitative ones for lack of objectivity. (Atkinson and Shaffir, 1997) This also relates to the way that the author is explaining what does she or he personally see, rather than explaining

what should we see, hence leaving room for interpretation for theory and findings. Lillis and Mundy (2005) also argue that cross-sectional field studies can enhance internal and external validity by utilizing management accounting studies as a social and organizational phenomena and cross-sectional analysis. Proper design of the study can increase the credibility and validity of the study, so "that the resultant studies are not viewed as superficial field studies or uncontrolled surveys of practice." Ahrens and Dent (1998) present views of storytelling that relates to how researches are built and constructed, but it is quite easy to agree that stories are more relatable if they are told in responsible way. They add that social science attempts to stay constant to observations of the real world is important and authors should concentrate on moving systematically from field data or material, through interpretations to clear and truthful explanations. This relates to the integrity of the author because he or she themselves are accountable for the method that is being used, and moreover to present data or findings in sufficient enough depth, which helps to connect or trace empirical data to back to theory. As it was stated in the introduction of this thesis, researchers need to have suitable balance between theory and field data, since field data without theory can be quite blunt and boring, and similarly theory without vibrant empirical data is seen rather empty. I will try to take these issues into account at the whole process of building my master's thesis. Another interesting and vital matter is the qualitative nature of material and data, is that for this thesis it is not possible to "hide" behind statistical results, but the subjectivity of the author is allowed since it can be a sophisticated tool for making conclusions and inferences (Ahrens and Dent, 1998). To remain the validity of the research and presenting the phenomena as truthfully and accurately as possible, these following factors have to be acknowledged: 1) Observer's reactive effect of the presence or activities on the phenomena which is being observed 2) Garbled impacts of selective perception and interpretations from the observer's view or part 3) The lack of the ability to take into account all or every relevant aspects of the phenomena.

4 Empirical findings and analysis

As presented in the method chapter I am going to analyze the main and most interesting findings from the 8 interviews that I concluded in Finnish. Those interviewees were management accountants, CFOs and controllers who had quite large variety of experience from few years to +40 years and in this part they are named from I1 to I8, in the order that I concluded the interviews. The author did the transcripts and translated the interviews to English, thus some of the straight quotes, which were used quite a lot in order to have credibility to this thesis, might be difficult to understand, but I try my best to explain them better. The structure of empirical part follows the literature view, so it would be easy for the reader to keep up with the thesis.

4.1 Business Intelligence

This chapter focuses on explaining Business Intelligence and how people perceive it, thus their own definitions are dealt with. Interviewees were asked how they understand traditional ERP systems, not confrontation setup, but why are those systems important and what kind of deficiencies they might have? Also the purpose and various benefits of BI systems are presented throughout this chapter. The last subchapter concerns what kind of BI systems are interviewees' companies using and what might be possible problems related to them?

4.1.1 Definition of BI and knowledge management

As already mentioned in the literature review people understand Business Intelligence in many different ways and it has numerous amount of definitions. In my thesis I did not restrict BI only to certain systems, but it can be understood as much broader concept.

> *"I feel that it means, that we are moving further away from emotional and intuitive based management to more real fact based (decision making)."* (I1)

The interviewees further explain that as people get information and data much more easily nowadays and utilize it in various ways, they do not have to trust on subjective opinions that much anymore. It has changed in that sense, that intuition is directed there where it needs to be, because the brains are not working well in statistical and massive numerical information matters. However, intuition has a place in many issues, where machines are not compatible, so it is transferred where it should be. I4's definition about BI was:

> *"I see that it is the production of systematic information about company's operations to support the decision-making process of managers"*

He explains that he sees it through his own work, that it means first and foremost all kind of data mining. In their company and in others the problem is usually, that there is a huge amount of data, which in their case means 150-200 different systems in group level, where the information is generated like sales, warehouses, security issues, production and customers. Considering BI, it is always critical what is the re-organizing concerns for example if they have profit responsibility, managed by business areas, or are they just cost centers. When nowadays all the managing is coming from the top and it is dependent from what kind of tools the managing is done by. I4 sums up his opinion that at least for him "Foremost BI means extracting all the relevant and essential out of data flows." The challenge in many cases might be, how to harmonize hybrid solutions' vast amount of data, and take all the good out of the data that is being utilized and often the old systems stay at least alongside with the new ones. Interviewee who works as a business controller adds that:

> *"I see it (BI) as a first or second level on how we develop in knowledge or information exploitation."* (I5)

He explains that his view is influenced by his own experience as BI consultant and he feels that there is oversized technical tone in the term Business Intelligence even if it actually means seeking understanding of business. He continues that he does not want to restrict the definition too much, that does it only concern financial data, because in his opinion other information can be meaningful and related to BI as well. Thus BI can be understood as the first step that companies want and know how to utilize vast amount of data in organizational management Another definition comes from I3, who is also from a service provider firm, and he explains it as:

> *"BI's role is to combine data from separate sources of information. […] So in the last resort the system need to serve you, without the requirements to send users to intensive 2-week training courses. […] To sum up the system needs to be logic and easy to use."*

Users of these systems should not need to know how are the systems coded, hence the complex technology does not show in any way. The functionalities should be so good that users learn to utilize them very quickly which is an essential part of it. Additionally, a successful information system implementation requires that the company has the right person for the tasks, who pushes

the project forward. In some smaller companies where the main tool might be Excel, the generator and utilizer are usually the same people, but in some:

> *"In bigger companies you might have BI teams which are technical side reporting team who does the actual reporting, then you have the business controlling function or accounting personnel who are more like the consumers of these reports"* (I5)

The interviewee sees Business Intelligence as the first step to analyses' optimization. Mostly when someone mentions BI, first thing that pops into your mind is reporting tool. Then again if it is thought; what does it mean from the business director's point of view, it means that do they understand anything and what they should do if some customer case is not working or sales is too low. Those are the questions that companies should found the answers, despite if they have a certain BI tool, analytics or reporting platform. For one of the CFOs BI means:

> *"Big set of figures in somewhere, and with help of BI those figures tell me something, and I can modify them in a way that they serve me the best."* (I6)

The starting point should be that BI relates to easier access to sensible information which is not only about the numbers, but instead it is somehow thought and organized and tells the users something relevant. Maybe that the financial figures are not in focus but the information outside of accounting should be. Another business controller explains that:

> *"I would see that BI is kind of collection of information and integrating systems and measures, which help the business to access and analyze critical information."* (I8)

Their company does not have a master system, but instead the information flows from different places and systems. For example, they have a project management and hour entries systems or it can be just talking to people and asking them how are they doing and through that management accountants can construct their views. She considers herself as an information 'mangle' at this point that she tries to collect all kind of information and data from different sources and see those changes and trends. I3 continues that his views were already developed decades ago in his studying period that information technology should be thought as an instrument, which helps to develop and enhance things. Because system itself does not solve anything, but instead it is vital how it is used and how can one take advantage of different systems.

What comes to the knowledge management, one of the business controllers defines it as:

> *"I see that BI is one part of knowledge management and subordinate concept, thus knowledge management begins from what kind of management team do you have, because it means how the company is run and managed"* (I5)

He argues that management starting from the CEO, determines how the company is being managed. Knowledge management can mean that you sell something and you have certain processes in place, which will make sure that the company know from a financial point of view what does this mean when they are selling something and what kind of costs will it generate. Thus the whole organization is deployed thinking issues through the accessible information and every decision should be weighted and especially in financial sense. I1 explains that from their point of view knowledge management is related to for example collecting real-time information from recruiting personnel on how their individual assignments are proceeding. They use that information to actively observe any kind of deviations from normal levels. It would not be working equation, if the company would only go by gut feeling, not with numbers when evaluating the success of personnel. Another interviewee, I2, brings out a little differing view and she wonders from her own experience, if knowledge management actually effects on decision making that much in different situations. She explains that she is currently working in a customer driven business unit, thus it does not make sense for them to trust too much on data, because personal relationships are much more important. So even if the data would say, that for example it does not make sense to give a discount, that might be very false decision and after all it does not effect on the negotiation process.

I6 continues the definition by stating relevant questions:

> *"What does it (information) tell us, if we consider the future measures, what should we do, where should we focus and that is knowledge management in its deepest essence."*

Their company is in a very aggressive growth stage and their service or product utilizes open big data, thus it is clear that knowledge management has a "certain kind of role" in their company, because it defines their existence that they sell it and other companies manage their sales organization with their solutions. Additional explanation about knowledge management is brought up:

> *"It (knowledge management) is a complex entirety, but we have our own BI 'orchestra' and it depends do you want to understand it as external data collection, or in some cases internal data."* (I4)

However, the interviewee stated that it is really industry specific what people perceive as Business Intelligence in the end. But as BI is more like handling data in some way and gathering that data and developing analyses practices, and now the dashboards have risen and other issues, where companies should put lot of effort and according to him, their company has already done that.

One of the interviewees noticed an interesting issue relating to knowledge management and its relevancy to shareholders and owners:

> *"It is very important for us to do monthly reporting and based on that, we analyze how has the previous month gone and big part of it is that our employees are owners, and because of that it is very important to share the information, so everybody has knowledge about how are we doing"* (I8)

Then based on reporting they make the necessary adjustments and measures and they can change their focus or direction. Thus it has to be acknowledged that different stakeholders influence on how knowledge is being spread and managed inside and outside of organizations and how open is the company about their information. This is very important to them and affects a lot on information sharing and they kind of feel it as their need and responsibility to explain how they are doing financially or otherwise.

4.1.2 Traditional ERP systems and lack of them

ERP systems were dealt with in previous chapters and I felt it was necessary to address these issues also with the interviewees that how they perceive ERPS, what do they consider as ERP system, what kind of lacks those systems might have and how these systems should not be considered as competing to BI solutions but instead enforcing ones.

> *"This represents that what do companies actually need BI systems for, so it specifically functions as ERP systems upgrade system"* (I3)

The interviewee, who works in a BI service provider company, also stated that actually ERP systems brought another customer group for them as companies that had implemented ERP systems which were intended for sales, production and other modules, which were traditional separate systems. ERP systems became the databases for their Primavista (BI)

system, thus it was like an ERP umbrella under the system. Then there were different modules underneath it, hence it was possible to get information through one channel to this BI system, where particularly the combining happens and companies get long-sighted outlook. If a company has an ERP system, then they have one essential source system for the data, and the information can be collected from different modules in uniform way. Then again if systems are older, then company needs to gather information from every source systems separately, thus transferring data is a difficult task for those companies. ERP helps with this and accounting or other personnel can use their time for refining information, which can also be done with BI systems and the gainers are management accountants since there is time for in-depth analyses.

One of the interviewees stated that:

> *"But honestly if the data of ERP is in order, then those companies can utilize wide range of BI tools and the opportunities are much better."* (I4)

He explains that sometimes it feels that ERP systems are downgraded or understated, that it is only something that companies need to have, but that seems to be further from the truth at least for companies which practice production. He argues that a good ERP system is a starting point and then when it is in order, companies can begin to think how BI could bring additional value. Interviewee number 5 adds that accounting system and this so called ERP are their two main data sources. Then they can modify the information in Excel, and their amount of data, which is about hundreds of thousands data rows, is not functioning in basic excel, but through power pivot it is possible. Excel seems to be an important tool for other management accountants as well, as almost every one of the interviewees mentioned it as one of their main tools.

I4 highlights that BI is the motor that brings the analytics, which it should:

> *"They go hand in hand, so my opinion is that the meaning of ERPs is to produce high quality data as fast as possible and effectively, so that as many people can access it as possible and data is in right form."*

Then BI takes that good base, which ERPS provides and starts to construct analytics, forecasting, different visual options on top of that, which will give a comprehensive view of company's operations and in which direction is the company taking it.

What is interesting is that ERPS definition might be also somewhat mercurial, since one of the interviewees told that:

> *"For us the project management tool is more like ERP system, which we have constructed ourselves."* (I8)

But how it differs from BI for them is that it tells the situation now, in which project are people now, who is available, who is coming available and what projects are starting? So in a sense for their company, which is a consulting agency in software development industry, personnel are the main resource, thus their project management tool can be understood as kind of a ERP system and it produces data.

There are also lotd of things that the ERP cannot do and those issues will be considered now and some possibilities and benefits of BI related to ERPS are raised into the light.

> *"The situation today can be compared to the 70s, when there were different systems and information did not transfer between them, so every system generated their own reports."* (I3)

It is possible to get good information about production from ERPS, but specifically it lacks the vital combining part and the interviewee has not heard that there is any system where some module would do this integration well, that you could for example get the revenue per person ratios. These are the kind of figures that he feels should have a lot of emphasis in companies.

Even though the visualization component is emphasized by many interviewees, these will be discussed later, one of the them argues that he is little skeptical about visualization features, because the fact is that some managers want to see the information as bar chart, some in pie figure or some managers in some different form. In the end the goal is that systems consist information in some certain form, so people can get it in sensible format and they understand for example how their project is doing financially.

> *"Definitely the number one benefit (of BI) is the centralized data or that you can combine data from different systems and report it in a form that people can understand it."* (I5)

Also the distribution of information is of great worth, so the people can control dispositions and spread the knowledge wider and in the end employees and managers can have discussion about the figures. The point cannot be the reports themselves, but how people utilize those reports and it needs always the discussion about figures and reports to gain the benefits. From the figures management accountants can make an analysis about the current state of the company, then they discuss about the actions that have to be taken. An important advantage is

the combinability of data, so ERP systems can restrict information and then BI system utilizes several data sources and combines the information. At some point the visualization of data has to be acknowledged and does one want to think that as part of BI system is completely own area. One of the most relevant points relating to this issue was that:

> *"If the data is only numbers without a decent visualization, then it might be hard to interpret."* (I7)

The visualization just has to be the 'icing on the cake' because if the basis is in bad shape and the information is not right, then the visualization does not matter at all. Hence we can ask ourselves what was 'the egg and what the chicken'. One of the business controllers summarized the concept of visualization relating to BI quite well:

> *"Overall it is important that the data is visualized in some manner, then it is easier to understand and you get very compact presentation out of them, so in more comprehensible form."*(I8)

I also wanted to find out if interviewees thought that do companies actually need ERP systems to get the best out of BI and one of the answers was:

> *"No. As said, ERPs are built from dozens of modules. Some large organizations that have for example different production, sales, POS (Point of Sale) systems could as well be underneath ERP systems."* (I3)

When a company has an ERP system, then there is one apparatus where the information is transferred to the BI system. If you have all these different systems, the IT team, outside consultants or software developer need to construct integrated systems from them and that requires quite lot of work and effort, thus it is only easier if the company has an ERP system to support the collection process of information and data. Many of the other interviewees said that they have separate systems like CRM, where they take information to their own excel files. But it is understandable through BI service providers' presentation, for, I2 how BI would work, where it is possible to have large amount of data in editable form, and management accountants or others can get quite different kind of view of company's real-time situation.

4.1.3 Purpose and benefits of BI

Many of the benefits and purposes of BI systems are presented throughout empirical parts, since they might be related to other issues. However here are some of the findings about

different advantages of these systems and what kind of issues influence on successful implementation.

> *"Systems can exploit these different data sources and combine information from them, especially producing effectiveness figures for example revenue per person, which in my opinion is essential point of interest."* (I3)

BI requires traditional systems underneath it like wage, sales, counter and bookkeeping systems. According to the interviewee one of the most essential issues of BI is that pretty much everything is digitizing, and upgrading of information and combining of it happens within systems and companies do not need as much manual labor as before. When people follow the earlier mentioned revenue per person ratio, after few years they can see in which direction is the trend going in the long run, thus is the revenue per person increasing or decreasing. Then there are traditional accounting reports which tell for example how much the department's wage costs were last month, but this information is useless on its own and managers cannot do any conclusions or decisions based on this. Management accountants need to distinguish longer trend periods and ask questions like how are the labor costs in relation to departments yield. Those figures present that is it developing or regressing and this is what BI produces on call.

> *"The support for decision making is important, and you have to always think that does it give support for that process or not."* (I5)

Interviewee stresses that these systems are meant to support decision, not actually make them. Vice versa it can be considered that if companies would have systems that generate decisions on their own and some managers think that they receive ready decisions, but in fact they would not be needed if those systems would do the decision making as well. Similarly, if a controller would only prefer to do technical reporting, then someone might develop a software which does that work for you, then that controller would be useless. Therefore, we always need a person who does the final evaluation and decides is this right and rational and what shall be done for this situation. Certainly in the future machines will do some tasks for us, but especially the decisions relating to machines will be done by humans and they are responsible for them.

The service provider interviewees have noticed that utilization of BI systems is quite good in Finland. As the other one states that:

> *"All the time it (use of BI systems) is increasing and in some way we are in frontier for BI solutions in Finland […] It comes from how people define BI, because if it is only a visualization tool, then it is fast to implement it, but the starting point is that the base data is in order or is it."* (I7)

A good example of this is the accounts receivable management, so practically speaking management accountants or other employees can access our real-time situation with just few clicks and see how our accounts receivables look like. Maybe it is more comprehensible and on average Finnish companies are utilizing these BI solutions more, but of course the focus has to be in the most important issue. Considering the implementation, as long as the base data is in good shape, it is very easy to construct a BI solution on top of the data. The CEO of one of the service providers argued that:

> *"It is a question of understanding the functionality and possibilities of the new system, so how the old practices and processes can be further enhanced, and it might mean that not so many people are required anymore."* (I3)

According to him, if some new system is implemented as such and it is only replacing and old system, but nothing is changed for example processes or practices and they are not developed further, the possibilities of the new system stay definitely unutilized. Maybe the system which calculated poorly and slowly got better, but if the practices stay the same, it is questionable what the actual benefits were. Additionally, the CFO of the growth company mentioned:

> *"I feel that modern BI's biggest advantage is the flexibility and (easy) usability, that if you want to for example change your way of reporting, there will be a new business area, or anything else, it is easy to change and flexible, and you can implement it yourself to the BI."* (I6)

This is a major factor comparing it to traditional ERP systems. If companies want to make adjustments to their base version, then some modification can cost for example 6000 euros. Whereas BI is living in real-time and the effectiveness of BI comes through the business. There is also the cost effectiveness as the BI systems are considerably more affordable than continuous modifications or additional modules to ERP systems. According to the interviewee, in the end if a company has a production function in any bigger scale, they need to have ERP system in place. I2 mentioned a specific system and its advantage which relates to all BI systems:

> *"At least what was mentioned about BI system A (in her previous company), the clearest practical advantage was that it was meant for everyone, collected data from everywhere and updated in real-time"*

That is why everyone could access the same information at the same time. She explains that maybe the problem was that different kind of weekly and daily reports were created in different cycles and people viewed them at different times. Lot of commotion was created, because people started to find different figures and ratios occasionally, which might compromise the whole system.

According to one of the interviewees the advantage of BI comes from the fact, that companies have processes, which can be for example forecasting or creating a budget. Those processes also need input for them, with those kinds of things Excel does not work well, if input is needed. However, the output is easy through Excel and people can make analyses and other things with it.

> *"Then this standardized system enables better distribution of that information and gathering input."* (I5)

I have had to really thought it myself as well, that why Excel could not be seen as BI system, if it combines data from different sources and there are visualizing features, different tools, power pivot, thus in my opinion even Excel can be understand as a BI system in some cases. Advantages usually comes from the fact, that companies have a system where several people have an access to and they can see reports on their own. Hence, it seems like that analysis work that management accountants are doing, that it is their advantage as well, to offer as much information as they can. This way management accounting professionals can harness others for the controlling work. In addition, they will have more time for development tasks and developer side, because the people who are operating closer to customer interface know the things way better than management accountants themselves usually. If they have a better access to the figures, they become kind of management accountants' little helpers, when they can their time for other activities. Because in principle, accounting function is not responsible of the data, thus it can be thought that business units own everything. If some figure is not on the required level or is over it, then the business managers are responsible of it. Controllers and other management accountants are just the messengers who produce the information, therefore companies actually have the people who are responsible for the business.

4.1.4 BI solutions in target companies and problems with them

In this section I will discuss about some of the systems that interviewees considered as BIS but most of the brands are left out, because the purpose is not to compare are some certain systems better than others. Additionally, many interviewees did not feel that they had an authentic Business Intelligence system per se in place in their company, but many of them are in the process of choosing and implementing one.

> *"Without going too deep or understanding complex technological side of it, and they (managers) got a really good comprehensive view and visualization about how the KPI (key performance indicators) had been developing."* (I2)

The interviewee explains how in her previous company the new system was implemented as she was leaving the company. Apparently there was a lot of hype around it and it functioned well and was handy. She perceived it as a BI system, because it was easy to use for everyone and one could do really specific searches with it, if they knew how the system worked.

As I have mentioned couple of times, I have taken the approach and view in my thesis that Business Intelligence can be something else than service providers' definition of a BI system and this factor has been acknowledged in this chapter as well.

> *"Mainly we use Google's own tools and it has wide range of solutions, where you can integrate information from different data bases."* (I1)

Thus the interviewee feels that they kind of have a primitive version of Business Intelligence system in use, where different models and Excel bases are being utilized. He says that they have developed them quite a lot and there begins to be rather complex spreadsheets and models around them. They weigh and evaluate constantly, when there starts to be too much data and they actually have to implement a 'proper' Business Intelligence system, but at the moment it has not been seen as viable or profitable option for them. Another business controller continues:

> *"Maybe you cannot refer to it as a system, but we have Microsoft office, Excel, and you can think that Microsoft BI offers quite capable analysis and technology [...]"* (I5)

Through power pivot they have done different models and with them they have been apparently able to conclude quite versatile analysis and reporting. Naturally there are lot of manual phases in that process, but they have also an ERP system which is a separate one and billing, work hour entries and sales orders happens through that system. The interviewee explains that they

get fairly ready reports and information from that system, then with excel spreadsheets and different models they constructed kind of an integrated system, where the different pieces of information are combined and analyzing. I6, one of the CFOs, feels that from accounting perspective, they do not possess a BI system, even though they use Google sheets and excel, where the information flows. However, they have an accounting system, which can be considered as BI tool, because it has for example built-in dashboards. It is also possible to generate different kinds of graphs with it, but not in a form that the CFO would like it to be. But in a company level, how they monitor their customer behavior, there are excellent BI systems or tools in place. Additionally, I8 said that they have an on-going renewal project, thus they should have better solutions later. At the moment they are working with quite traditional tools such as Excel sheets and collecting information from other sources like the mentioned project management, hour-entry and basic accounting systems. According to the business controller all those together produce different kind of data, and based on those they make monthly reporting package.

> *"We have a BI system B, which we can use for analyzing sales end and then the system which is concentrated on vertical profitability."* (I4)

They are also using SAP and different plug-in for it. I4 explains that this is the direction where they are going with exploitation of ERPS. Hence lot of performance management comes through group reporting, but they have certain problems relating to that as well. Interesting phenomena is raised by I3:

> *"So the idea is that if you are one of the ground level salesmen, it is you that makes budgets, decide on the volumes and prices."*

The CEO explains that many of their customers are used to running their financial administration internally in accounting function like reporting and budgeting and other organizational members have not intervened it in anyway. Their software offers a change to this and as mentioned in the quote for example sales personnel concludes their own budgets and even further forecasts about the future sales revenue. So as the year matures, employees themselves follow how the budget figures are coming true. Also relevant to this issue are analysis tools and tracking how realizations differ from actual figures and different members of the organization do the conclusion from those. With this mindset and working style, they have the forecasts which can be called fixed budgets, thus the idea is that personnel have the information in their systems in at the bottom accuracy level. At sales this means per customer,

per product and depending on product even per item. If the planning has been done with this accuracy, it gives the sales personnel and their managers the opportunity to see if the budget is being fulfilled and where the changes are by the end of the month. If you have done your planning with sufficient accuracy and monitoring is in the same level, you can see that now the realization differs from what it should be, which is that simple. This is the change that every one of their customers have executed, so again decentralization of ownership is important and one of the most essential benefits of BI systems. The interviewee concludes that certainly their software is a BI system and data or information is not only brought from accounting systems but also from sales systems, ERPs. Hence when integrating data, their customers can produce efficiency measures. Additionally, the world has come to the situation, where people could have only one tool, which can operate execution and monitoring, but also only one tool for planning. The other service provider's CFO continue that they have all kind of BI solutions and systems, starting from visualization and this kind of self-service based. On the other extreme there are well structured and dashboard kind of solutions, so they have software from side to side. One major issue which is making its way is:

> *"There is also these predictive analytics which will be the issue of the future."* (I7)

These last paragraphs of this subchapter are presenting the possible problems related to BI systems and to their implementation.

> *"The biggest problem seems to be, that there are lot of functionalities that are left without proper use, because users do not know how to use them."* (I1)

Hence the biggest obstacle for the effective use of BI systems seems to be the complex functionalities and for this reason, there is lot of utilization room for improvement and how to really get additional value from Business Intelligence. Firstly, management accountants might do conclusions based on random correlations, but it is not a valid causality when only two numbers might go down at the same time and conclusions are based on this kind of correlation. In I1's opinion the biggest threat is that companies start to make hasty decisions based on figures without understanding the real comprehensible picture that is related to the issue. Another problem is the validity of data, so how is it collected and is it certainly the kind of information what the company wants. For example, how can the company make sure that different sales people produce the information in similar kind of format? Also have everybody surely understood issues in the same way, if such issues as expected billing is dealt with. This

is quite a big problem which might cause systematic mistakes in BI systems. One of the business controllers state that:

> *"I see the biggest risks relating to usability, if for example management has used to get certain kinds of reports and they somehow get stuck with them, or they start to act in certain way to increase some individual KPIs and forget the overall picture."* (I2)

It certainly depends on who the systems are built and how it is used. But on the other hand, the good thing about BI is that it gives multiple views and comparability. Analyzing this statement, one can think that some companies understand BI as intrinsic value and that becomes a problem if they do not actually evaluate, what are the concrete benefits from the systems?

As mentioned before, companies need to usually also re-organize their processes when implementing new systems like BI.

> *"The starting point is completely wrong, if the management do not think questionably its current processes, instead they instill the system without changing anything."* (I3)

In his opinion BI systems consist of more than ordinary systems, thus the system has to have an owner. If the company does not have that, the advantages might be very questionable. Usually the owner may be the CFO, but usually the 'eager beaver' is controller or group controller. Additionally, probably the most common budgeting tool is Excel, which is originally made for single department's instrument, which works greatly in there. However, you should not make it as large organization's central and disseminated system, which one can actually construct, but no one in their right mind dare to touch it afterwards, because it might fall apart. Nowadays monitoring reports come usually from bottom-to-top, so from the ground level with the help of ERP, but if one has bottom level realized figures and on very high level the budget figures, it is hard to get anything out of it when these completely different numbers are compared.

Problems and obstacles might relate to the fact, that IT projects attend to swell. It also means that when the company has made an investment decision then the project may be delayed, which costs lot of money. Thus project management team has the responsibility and threat of carrying it through. Moreover, compatibility problems relate unfortunately often to consulting agencies who promise 'the moon and the stars from the sky', but the reality is usually something completely different.

There are already examples from dashboard reporting, which will in fact make lot of management accountants or controller unemployed, or at least the role is changing towards business and system maintenance and handling of it. I4 explains that some studies suggest that machines and automation will take 99% of current management accountants tasks and activities in the next 10 to 20 years, but he still want to stress that the function will still need people to develop those systems, validating data. The data will never go straight to business managers' desks, instead there are people in between. Additionally, forecasting side is like a black box, thus forecasting will or is already been done, but what are the necessary accuracy levels and certainties of forecasts? Also if management accountants are reliable and certain about the next six months, can they expand the scope even further. The forecasting data in group accounting is in IFRS systems and it is many times a bit difficult, thus forecasting side is usually handled and twiddled in excel and with own forecasting models. When people know more and more about the future, the risks approach to zero. I5 sums up quite nicely that:

> *"People cannot trust blindly to the systems."*

This is because people are the ones who are producing the data, if consider the interviewee's company, he evaluates that 95% of the data is produced by personnel. Thus most of the information he analyzes and modifies is generated by people. And there is nothing new that some of the data is incorrect. Additionally, he explains that one threat is that people should not make decisions based on any kind of management reporting that you do not understand fully and cannot make a comprehensive picture out of it. So people need to really analyze what do the figures tell you and what presumptions are behind them, and what are the risks if the data is false? According to I5 another threat is the information security, so the question is that to who can you share the information and how well protected it has to be, then cost effectiveness vs. information security has to be evaluated. I8 complements this view by saying:

> *"If people start to stare at numbers too intensively and optimizing some key ratios, that we would not forget that they tell only something from a certain point of view."*

She states that people should not guide business too much based on some key figures. She tries to remember that it is not the goal to generate figures but the goal is to make good business. She adds that people should not guide business too much based on some key figures and they should try to remember that the goal is to make good business. The numbers and figures are

actually subjective in many cases, even though they are often thought objectively. Another problem that rose from her and from many other interviewees was the validity of data.

> *"There is the reliability that if it is questioned even a little, then the benefits disappear immediately. There needs to be validation!"* (I6)

There exists a lot of false data, thus validating is so important. The validity of the information is a certain threat according to I7, if people start to trust the data blindly. But in a sense that is how it should be, because then they might do wrong conclusions or decisions, when the data is false. Additionally, some kind of data privacy may be a problem in the future, especially if we talk about HR issues, hence this validity of information and who has the access to which information.

The change has been quite noticeable, that many modern tools are easy and fast to implement. When it is done in cloud, they usually only answer to small part but the interviewee seems to be aware that there are not any universal solutions yet. There begins to be multiple tools and even though they are light and easy to use, in many cases they are vertical tools and they strike to one certain problem. Then if those tools collect data from different matters from different sources, but those systems do not speak to each other, then there will be a problem of multiple usernames and the analyses become fragmented.

4.2 Changes in accounting profession

This section concentrates on the development of management accounting function, since it is quite evident that management accountants' job description is way different than for example a decade ago. New job titles have emerged and controllers' will have to have much more comprehensive skill and mind set, than before. I will also present what kind of responsibilities do the interviewees have or have had. Other influence factors than IT are also presented, and I asked the interviewees' opinions, why has the role changed?

4.2.1 Interviewees' job descriptions and traditional role of management accountants

The assistant financial officer (I1) explains that his job description includes operative matters, which relate to financial administration. In practice it means accounts receivable and payable, sales invoices, pay slips and additionally their CFO concentrates more on strategic side of the business. He states that he supports and participates closely to analyses side and other tasks with their CFO. Then again I2 told about her past work as assistant controller, where she worked in sales and marketing. Her job was related to the company's main business and she

executed the reconciliation of sales, expense tracking of marketing, and she was also responsible for accounts payable. At another position in the same company her mains tasks included following revenue and sales, tracking costs, external reporting for Bureau of Statistics and internal reporting for management team. She also handled deprecation, investments, forecasting and budgeting in all of her different jobs. Nowadays there is lot of forecasting which included in her role as well. One of the business controllers describes his job as:

> *"My usual role or tasks are related to monthly standardized work, which takes about half of my working hours. Then there are different kinds of projects and I get lot of ad hoc tasks from the management team, and we try to answer and fulfill those queries as fast and effective as possible, so they go right already on the first try."* (I4)

He has worked in his current company for three years, and the first two he was working in group accounting as a controller in headquarters. Now for the last six months, he has been in business analysis function, so more management accounting tasks at the moment. Hence it used to be, that he was collecting more versatile data from all over the organization for IFRS bookkeeping and validation of data. Moreover, different problem solving tasks and especially gathering data is part of his current job description, so more internal accounting which consist different kinds of management reporting activities. Interviewee also said that he is responsible for their group forecasts and reporting the related issues for it. He explains that that the end of the month is when group accounting has to balance the numbers and then they start to analyze the data. Apparently second half of the month is quite tied to monthly reporting and the first half there is lot of project work, getting ready for the reporting, thus all kind of ad hoc tasks.

The business controller who works in ICT industry explains his job:

> *"Pretty much this financial (external) accounting has been restricted out of my job description, thus my job is to have dialogue with business managers and sales personnel, that what is practically happening there and how does it show in our figures."* (I5)

He has worked four years in his current company and in management reporting before that. His role is to handle the numbers and do analyses, he wonders that maybe the analysis part is even more important and supporting organization members with numerical analysis. Apparently his normal day consists modifying forecasts to real figures in shape of business cases, hence he analyzes occurred numbers like sales, financial numbers or others as well. He is also part of

their business unit's management team, where his hierarchical supervisor (CFO) is not involved and neither other personnel from their accounting function. However, he explains that in matrix organization he gets lot of different kind of tasks from both directions. One of the CFO's has quite versatile resume as he has worked, starting from 2007, in investment bank as an analyst, in Nordic construction company as a business controller, couple CFO positions and even leading a sales organization for 1,5 years. He explains that actually one of the most benefitting experiences was the sales job, which was in his own words a "teaching escapade in the middle of operative core". As mentioned before, he is currently working as a CFO for an aggressive growth company Vainu.

I had also a privilege to interview that CFO of SAP Finland who has gathered 11,5 years of experience in that company. He describes that most important parts of his work is business planning and analysis, thus the business controlling function. He has one business controller in Finland and with him they give visibility for the figures in software business and service business, hence budgeting and forecasting. He also states that:

> *"In a year I have about 25 customer meetings. It also makes my job interesting, as I have spent my entire career in SAP, so I can see how things are done in elsewhere."* (I7)

This can be seen as quite unique position and situation. Hence another pillar for him is their commercial part of the organization, which means supporting sales and practically speaking it means that he has two contract management persons in his team who support sales teams. Relating to this, he is trying to actively visit customers and tell them the "SAP story", so how their own organization's implementation went, what are the benefits and how does it show for CFO?

I8, one of the business controllers, explains that she started working in the company back in 2014 first in sales and then moving towards sales reporting. Afterwards she transferred to accounting function where she has worked little over a year. She continues that at the moment her main responsibilities are reporting and analysis, but also the development side of accounting function has been an important issue from the beginning. She is part of their accounting development renewal project, which means more of operative tasks. Additionally, she is also responsible for their foreign subsidiary's reporting team and in their accounting function, thus partly billing for their USA subsidiary. Some of the ad hoc tasks relate to individual analysis work and sometimes she helps with accounts payable, depending the team's

resource situation. In the beginning her job included little bit of everything, but now it is more focused on reporting and analysis, then on the foreign subsidiary, but depending on the situation little bit of everything since they have quite small accounting team.

Traditional role of management accountant is very much related to bean-counter tasks. However according to I3, somewhere in the 80s or 90s controller title became more common. Back then their role was to monitor "the rear-mirror" and producing knowledge and analyses from that information, but nowadays an additional title, business controller, has come along.

> *"Nowadays these developments in systems have enabled business controller's role."* (I3)

According to him, it was noticed that controllers handle and produce information effectively, and they analyzed what is the history of the company from this day to the past. It became necessary to acquire more people, whose main tasks were to paint picture about the future and how does it seem tomorrow. I5 explains that he sees the traditional management accounting as a manner that business controllers are controlling the business and making sure that the cost structures are in order. This strong cost orientation means that registrations need to be correct and emphasis on actual figures, thus he sees this profitability factor or viability counters as the traditional role for management accountants. One of the CFO's evaluates the traditional role by saying:

> *"Explaining the report, where we are now is in the end not that interesting. Then when you add and compare history, present and future, and where were we supposed to be, then the report has interesting content."* (I6)

The basics have to be handled, management accountants need to have credible way to do bookkeeping and produce figures out of there. This way they can generate meaningful information for management based on financial data, which creates a picture about the future. According to him reporting is the main task for controllers and CFOs, that people not only know where they are right now, but where the company is going especially financially. One view is that:

> *"Maybe they (management accountants) generate or read ready reports and make different conclusions from those and they try to find changed and trends from them."* (I8)

Then if the role of CFO is considered more generally, then the interviewee thinks that traditionally they construct a comprehensive picture based on those reports. Moreover, CFOs make some kind of measures based on analysis and data. Another CFO, I7, says that management accounting roots are in traditional bookkeeping, which in his role is quite thin and he further explains that it is not even his thing. He adds that of course he needs to understand it on higher level, but in their company's way of working is that the CFO ensures the completeness of financial statements. His responsibility is to spread elsewhere that information, which might have some relevant meaning to financial statement, then. The company actually has local chief accountants, so the main person who is responsible on Nordic level and makes sure that bookkeeping is valid. Then with the information that comes from the CFO or others, he or she has to make the right entries. Naturally this releases lot of time, when the CFO does not have to concentrate on bookkeeping details. I1 explains that, at least in their company, in the beginning of the month management accountant's job is related to closing the previous month such as billing customers, paying salaries and making sure that bookkeeping is in order. Then rest of the month is more variable and lot of tasks are related to development of accounting processes and others like creating next year's budget. Additional comment on traditional management accounting's role is that:

> *"I see that management accounting and controllers' tasks are to support management."* (I2)

She has seen that, if there are some challenges, which the management cannot handle themselves, then management accountants help to produce the needed figures. The interviewee states that a big help in that has been the executions of practical budgeting processes, coordination and forecasting. She feels that initiative and pro-activity has become ever more important, if she sees risks or possibilities, then she broach it with the management team members. Moreover, she explains that in all of her jobs she has had very tight contact with management and been a member of management groups. She had many one-on-one meetings with executives, even if there were not scheduled meetings for every week. Sometimes she sent excel files for them to explore before the discussions Also one of the interviewee's opinion states that:

> *"Lot of the work is related to validating data, because in the end the data is our backbone."* (I4)

The business reveals that they have a large organization and accounting function has over 300 people worldwide. He argues that they have pretty good processes in validation, so management accountants get it effectively. Thus if accounting function is divided to three parts, he especially means controlling and producing data, there are factories and sites all over the world, who are inputting the data. Those employees take it from their own warehousing bookkeeping data and feed it to the system, and then they have the group accounting which takes care that a) everything has been reported b) the figures are valid and c) the completeness looks sensible. Then business controllers get the data to business analyses department and business areas have their own controlling offices, which generate figures internally. Hence business areas' managers and business controllers analyze the data, but from very different perspectives. The management accountants have to create the whole group view from those numbers. The 4th level, financial administration or CFO then utilizes the data for decision-making. He adds that:

> *"In big picture I do not see a massive change in controllers' role, (maybe) more in the work practices, that who generates what part of the puzzle to the whole entity. And I feel that the next 5 years will bring wide changes to this!"* (I4)

However, he argues that the traditional role of management accountants does not transform to anything else. Management will always need information and management accounting is generating it for the use of other functions, thus it is quite impossible that this function disappears in the future, as some people wonder the effects of automation and AI (artificial intelligence).

4.2.2 Developments in the role of management accountants and reasons for the changes

There are internal and external reasons for the role change, and I am going to address those both. I am going to discuss for example about the expected more comprehensive, business-oriented, educator and consultant role of management accountants. Maybe it was little bit surprising for me, that many of the interviewees highlighted that lot of the experienced role changes relate more to the person itself.

> *"The role changes according to my know-how and skills, how active I am in certain things and what kind of technical skills do I possess to do technical (savvy) analyses."* (I5)

Even though the interviewee emphasized that his experience is fairly short and major role changes have not happened in his time, these issues seem valid as many of the other interviewees stressed the same factor.

I6 explains that the job in a growth company is quite different from traditional CFOs role, as he was actually the one who has started to establish the whole accounting function into the company. It was not rational anymore that the CEO of a 70-head company managed financial and accounting issues. In lot of companies, CFOs main role is to maintain views of the future, optimize some things and bring certainty. He emphasizes that he needs to see to the future, what will people need from accounting function so it will hold up when they have 200 people working there. The CFO mentions that he or they need to make sure that the growth is also sustainable. He also states the kind of obvious fact that of course your responsibilities expand wider, when you jump from business controller to CFO position. He started with basic issues in accounting function, even reporting is reporting and observing the present, and presenting those figures in a sensible way. But according to him the biggest leap has been sales management experience, and how it taught him and opened his eyes. So if a person is part of accounting function he needs to be in touch in everyday business, and CFO should be focused on customers in some way nowadays. Management accountants need to go to the center of the business and really talk to those clients, so you really understand the needs and demands of the customers. He stated that:

> *"You really transform into something useful, when you understand the needs of customers and sales personnel."* (I6)

He describes how he saw 8 years ago that accounting is just accounting, and management need the reports, figures and make sure that they are valid, which is still important for accounting. However, he emphasizes his sales experience and recommends it to other CFOs as did I7, who also mentions how in their company the amount of accounting staff has dropped drastically as the revenue and volume has doubled. This phenomenon is however quite usual and general at modern times. He continues that companies and especially theirs, has practically transferred all local accounting team's tasks to service centers.

One of the interviewees also underlines her experience from sales and sales reporting by saying:

> *"Hence it is wide the apprehension about our own business at the moment through my experiences"* (I8)

Nowadays the role of management accountants has expanded as they need to make a comprehensive picture about what is happening in the company. Then there is the number side, which has come from her other job, so she feels that she can analyze and see what is behind the numbers. She wonders that maybe skills related to her sales experience help her to notice the small nuances, which come from the business. Hence she can then see the changes in the figures. It works both ways, when management accountants hear that something is happening in sales, a new case perhaps, and then they know that this can be seen in revenue after certain period of time. Thus people make kind of a connection that they do in their everyday work and how they affect to the comprehensive picture. If the company is bigger, management accountants and controllers often work to support the executive team. So maybe the development of the role relates to understanding the business, which has not traditionally been on a strong base for accounting professionals. She sums up that:

> *"I personally feel that my role is to be the information source […] Then you can collect the things that help to make business decisions."* (I8)

Comprehensive role

As mentioned many times in this thesis, management accountants seem to have wider and more comprehensive role which is also the opinion of the interviewees.

> *"I see that I have developed in my job and field of business, so firstly I had to do lot of manual tasks [...] Now when those tasks are routinized, I can focus on different things and got closer to the actual business"* (I2)

She explains that she has seen that very clearly and even if the technology has been the same all the time, the way she utilizes it has changed drastically. It took her a lot of time and energy to produce basic data and getting into the job. But in that point where she started to get information out in the way she wanted from the systems, that was a huge step. She says that she has developed exponentially in her job, if one would compare that she would have stayed in her starting level on utilization of the technology. Companies might have several systems implemented and the data may be fragmented. Thus management accountants need to know where to find the required information and how can they integrate them, and from which channels or systems should the data be collected. Before people learn that, it may be hard to produce deeper analyzes on anything. For example, if we consider discounts for customers, management accountants need to understand where to gather the information and find different causalities which they did not perceive first.

Business controller, I4, says that his role has changed especially because of his developed skills. He personally feels that his role has only grown further, and after the transfer to the other team, there was more growing space. Hence he feels that management accountants need to be hungry, learn new things and bring it also forward in the organization. However, people also need to be in the right place at the right time.

> *"I feel that it is more comprehensive and in general everyone who are in headquarter level in accounting are participating, then they need to have holistic view for it."* (I4)

The interviewee states that management accountants need to do monitoring and make sanity checks, so analyze is something sensible and combine different kind of data. Because if the results show something and cash flows differs from it, does it make sense in any way. Accounting professionals need to question things all the time, thus the interviewee sees the role more comprehensive. Also work activities are changing thus it can be seen that technology and automation will do the bean-counting work in the future and data quality will be better and better, or maybe even more organized form. The idea is that analytics and decision supporting will be the tasks that especially management accountants, can concentrate on. So the data would be higher quality, come faster, more often and ready to the desk. Another interviewee states:

> *"All kind of exploitation of data is a buzz word of today […] The role may be at some parts more and more out from the accounting function and emphasizing a kind of data scientist type of role."* (I5)

That title may have too technical tone, but in any case management accountants are exploiters of information and advisers for the management. It does not depend on management accountants' role, but instead the comprehensive role comes through their development of skills and expanded responsibility portfolio. Hence it starts to guide people's thinking towards more strategic thinking and comprehensive views and they learn how to put themselves in manager's shoes and think issues from their point of view. It is not so much that management accountants have generated the information what was asked from them, but really think is it really relevant from the manger's point of view. So the role might become kind of like adviser at some point, which has already happened. I6 also explains that:

> *"I sit down with sales director or team leaders on regular basis to discuss how are they doing"* (I6)

He says that his role is definitely more comprehensive, and in practical terms the activities are different than before. That is the best way to be "inside" the business, that management accountant sits and reserve half an hour from his calendar for them both to discuss where are they right now, what do managers need from the accounting function and what might be management accountant's view for future sales developments, and reasons for them. I7 states that there are not as much bookkeeping tasks than before and he has gotten closer to business and customers. Hence management accountants can be seen as the sparring partner for sales managers and others. Then there is the BI which has a really important role, that now people can show and explain things and figures much better than before.

> *"As I have explained what kind of things and reports I can offer, then the demand has increased." (I6)*

When accounting people found the right persons who are amazed that it is able to get certain kind of reports out of the system. Then the demand of management accountants' expertise has increased and they do more reporting and analyses than before. I8 explains how many companies have disconnected accounting function and business and they are very separate entities. The interviewee has tried to bring them closer together with her actions, because it helps both sides when people are not so used to figures and numbers. This might be quite difficult in the beginning, but in the end it is quite simple and people get so much out of that information, which they would not gotten otherwise.

I3 explains how in some companies, CFOs have become supervisors for CIOs (chief information officer), when they used to be equals before. That represents well that CFO's role is much more comprehensive in modern times. Also it is related to the fact that IT has become a tool or an instrument which produces information and serves organizational members. Another thing that he argues is that:

> *"It is quite rare that a company really does strategic management."* (I3)

The strategic side of business attends to be exaggerated in many cases. The interviewee points out how the horizon usually stays very short-sighted. It has always bothered him, when people talk about strategies, which is why there is a slogan that "All the best strategies are written afterwards". In his opinion, few and far between are the ones who can see wholeness today until few years into the future.

One of the business controllers, I4, adds that if their team work is analyzed, lots of things are related to cash flows, revenues, key measures, personnel and security. Then in a sense the

business controllers are responsible in very wide scope about company's financial management's figures. He explains that in his opinion their company is falling little bit behind, since there have been many large investments like visual analytics which is emerging strongly. What it does is that in fact it is taking data from ERPS and makes it into visually more attractive with dashboards. Thus it is different today, when data is pulled from ERP to Excel and processing of data happens in there. Afterwards the data is taken to PowerPoint which is further taken for management's desk. He also says that:

> *"Thus it is quite comprehensive, what are the ad hoc issues related to."* (I4)

The interviewee explains how that side of the job is actually one of the most interesting things in his job. He also likes that there is lot of standardized tasks, but half of the work is kind of that he comes to the office in the morning, and he has no clue what is waiting in there.

Business and future-oriented role

Business controllers have to understand quite a lot about the business, and their knowledge needs to be wider. I3 talks about when the technology and controller title changed, who used to be very concentrated on bookkeeping information about the history. Nowadays if people talk about controllers, they are given a title like group controller, which includes much more widened information producing and he tries to look forward. Besides I4 sees strongly that whatever the role might in big companies, who have a massive amount of reporting requirements and huge amount of information all over the world. He believes that organizations are trying to find cost saves from these, thus searching them through automation, no matter is it production, financial management or anything else, then it is emphasized that different kind of experts are needed. One might actually speak of inner job markets, so personnel like management accountants become internal consultants. I5 continues:

> *"There is lot of talk about change, that management accounting should be more business-oriented, still the controller term refers strongly that you would control something."*

This term is old-fashioned, because usually you have for example a machine which monitors temperatures, so they would not go over or under. Nonetheless management accountants should be the ones who takes the temperature up or down with the help of management. He argues that lot of the academic research and education is concentrated on the steering side and how do management accountants control something that is happening there. I6 thinks that accounting function's job is actually very easy, when company is doing well because management

accountants report the "nice" things and do small optimization. But in the end sales should be emphasized, since end "new Euros" comes through that mechanism. Thus if management accountants like CFOs would do it themselves it opens up their eyes in many ways. Lot of the interviewees highlighted the future-orientation:

> *"At least in our company, we are trying to construct all reports at the moment in a way that 50 percent is bean-counting figures and past, and even more figures and analysis is focused in the future and forward looking."* (I4)

According to him there are lot of forecasts which are build monthly, but not every detail is estimated or forecasted. Then outside the basic package may come key measures, and how do they look like in the future and how is it going to develop. I3 continues that controllers have to analyze or interpret all kind of information and explain what it means. Nowadays people are not advancing from controller position to group or business controller, if they do not see or understand the business and the field of business where the company operates in. It cannot be based only in numbers anymore, but you really have to understand the operations.

Some extra roles were mentioned like teacher, educator and consultant.

> *"In addition to refining information, management accountants are starting to take roles like interpreters and consultants."* (I4)

So management accountants explain their managers, different departments' supervisors and executives, what does that information actually mean. He adds that naturally in their industry it is a little tricky, since the price of nickel is controlling on how the markets are developing and acting. But the direction is clear, as they have new management and new CEO, who started in the beginning of this year, and CFO in the summer. They have a clear focus on more forward-looking views and analyses these days. I5 adds that he sees the bigger picture as more and more, people are seeking management accountants to be sparring partners for management. If they are part of that certain business unit and they perceive themselves not only as business controller, instead they actually might become kind of like business developers. And those people play a major part in developing that specific business. Thus management accountant is not a watchdog role anymore, but they are actually very involved in the business.

Reasons for the role changes

Here I present some reasons behind the role changes and pretty obvious one is:

> *"If I think about my colleagues, their roles have changed a lot because of the new technology and developed with it."* (I4)

The business controller says that technology is one of the most important factors which comes on its own. Their management changed, which was an essential issue when the new managers are modifying the organization little by little to look like their own. Some roles and departments may be integrated or they disappear, thus some tasks might shift to other people, or they can be eliminated as well. Hence the management is a vital factor and technology another, of course different mergers and acquisitions are a third one, which affects the organization and the roles. I5 additionally explains that:

> *"It is the massive growth in amount of data and digitization which steer companies the most."*

However, he wonders that there have not been any bigger changes, it seems like person's competence and the specific company affects the most to the role. But with a broad-minded view, the massive transformation is clearly digitization, and IT is a good partner for doing your tasks as effectively as possible. He argues that business controllers should also highlight their role in creating and analyzing customer data and purchasing behavior, because those issues should be linked back to the company's business. The CFO of the service provider company said that:

> *"There are probably two concrete things; first one is this service center and another the enforcement of analytics. That there is really an easy access to information."* (I7)

He explains that for example when he has a meeting next week and certain things have to be undergone, he does not need to call controller week before, that deliver me these numbers, instead with a push of a button I can get them. In addition, the CFO of the growth summarizes the role change phenomenon pretty well by saying:

> *"It comes pretty naturally, that there are change situations, when people are given more responsibility, and some people are ready to carry it."* (I6)

Thus he does not see much external reasons for why his role would have changed. He emphasizes that when people get more responsibilities, usually it begins from the person and does he/she have enough motivation and ambitions for expanded role. The situation might be a bit different in other context and external factors may have quite an influence on management

accountant's role. However, as he continues the story by saying that it is pretty easy for management accountants to stay in their own corner and do kind of basic good work. But it depends on the person is she or he willing to go the outside world. In bigger companies it is easy to work for 40 hours a week, but if should go outside of your own comfortable zone, because many are not forbidding that. Hence it has to begin from themselves, since no one will 'kick you in your butt' to do that.

4.3 Impact of Business Intelligence to the role of management accountants

This is the last subchapter before discussion section and in a sense it is the most fruitful, since lot of the thesis' objectives and research questions relate most to this part. The focus of the findings is in the benefits that BI brings, which contributes to the altered role of management accountants. Clear reasons for this are automation of routinized work, decrease of obsolete tasks and effects on traditional management accounting. I will also present what kind of new skills the interviewees feel that modern management accountants should have and how they expect the role or the phenomenon to develop in the future.

4.3.1 Automation and decrease of manual work

As said this is one the most obvious benefits of BI. The assistant financial officer tells an example about how their management wanted information about personnel's salaries and it used to take lot of time.

> *"But now that we have systems in place, that calculate real-time revenues and salaries, I can offer that information immediately and even with standard deviation or other needed information."* (I1)

He describes another example of automation is where they used to have a person in his role, who had to send about 100 different invoices and enter individual invoices manually for multiple companies in their accounting system. However nowadays he can copy paste few things and press one button, which generates automatic files with VBA for the accounting system. This small change has saved more than 80 percent of the time that they used to spent on that matter. Moreover, he has been given quite free hands to take accounting as far as he cans and wants. Hence he took quite quickly a point of view, that he wants to have more time to work on management accounting issues, but first he had to reduce manual and routine work.

The first seven months of his job was related to automating routine tasks and lot of changes has happened in that period of time. I3 explains that:

> *"Financial administration function does not need as much manual labor than it used to require."*

Nowadays there are assistant controllers who participate in information refining process, but traditional manual handwork is decreasing drastically. I8 adds that different kind of exporting of files will probably disappear, because many times they can be collected straight and automatically from the systems. Hence you do not need to combine and transfer information from one place to another anymore. She says that there is lot of modification and transferring work related to it and those functionalities integrate well together. Maybe the exhaustion with excel will decrease Also one of the CFOs states that:

> *"There is not as much data crunching than before in excel, instead by pressing a button you can get certain views ready and I can concentrate on data analysis side."* (I7)

For I3's company, Excel has been used for entering information manually from bookkeeping and also information from CRMs. Now above all these BI systems are automating the same work. Especially just the kind of routinized collecting and reshaping of information has for the most part vanished. I7 explains how certainly Excel and using of it, is not as relevant as before, but the validity of data and ensuring it has become more important. The business controller continues:

> *"The data is taken straight from ERPS to visual analytics systems, and there you can produce presentations for the management, and they can modify the data themselves in there. They can have different options to change parameters from occurred to forecast information, change by areas, thus the managers can do the modifications themselves nowadays."* (I4)

This way also lot of accounting tasks are empowered to managers and the reporting is less static than before. The manual work has decreased clearly and even more in headquarters level controlling and business controlling goes towards validating data and making sure it is in order with spot checks. Then of course management accountants need to have good tools which are helpful to validate the data. But the role is not so much actively participating in generating and feeding data, but instead management accountants have a role of "watchdog", which was one of the traditional roles. Nonetheless I6 explains that in general level watchdog way is not

enough, because it does not give enough conclusions for one's own work. It is quite much experience based, that when for example a management accountant works in accounting for years, he might have seen a bit of sales, then on top the company might be dynamic and the expectations high. Other people's expectations for them might be, that they want you to tell them how should something be done differently now or in the future

One of the business controller hopes that lot of data transferring from Excel to PowerPoint would become obsolete, which might not happen anytime soon. However major part of copying data to another place may be automated pretty soon.

> *"There is work in making sure that the data is fulfilling high quality requirements."* (I4)

One could say that they are still in the construction phase, so necessarily the decrease of manual work does not show yet. However, he points out that the idea is that they reduce manual reporting hence they would actually really have the time for analyses and forward oriented views. He argues that one cannot in a sense use too much time for it, because of course forecasting is always more or less speculations. The resources are steered to that section, so they could get more up-to-date and accurate views on future developments. He ponders that are controllers supposedly going to be unemployed in the future, but then in that point BI can actually produce all the data from the past, and forecasting analytics is left for management accountants. Again the discussion about strategic work rises and this time in a positive sense:

> *"Smart tools are the clear answer, that CFO saves time and can use it for example for strategic work (figuring out the big picture) […] (In the future) that kind of validation work can be done by someone else than a human as well […] What I try to do is maximizing the time I use in analysis and thinking work."* (I6)

It is kind of process-like, repetitive work should be minimized especially if one is a controller or a CFO. Another thing is the ease of use factor which enables everybody in the organization to see the big picture clearly. Of course it is an organizational question how open is the company, but for their company, everything is very open. They share the login information and say that personnel should study and use those systems, and asks if any questions rise, so curiosity is a major factor and people should have that. Moreover, the manual work has decreased, but the company has not yet reached the point where cross-checking and data validation would be automatic. That would be a big step because accounting function attends

to spend quite lot of time for that. He would like to spend that time for extra strategic work. I8 states that their aim for everything is to reduce basic exporting and entering and all kinds of manual and obsolete work. Then this time could be used for interpretations and analysis and you can crosscheck that the data is valid

> *"(The work that has become obsolete) is combining data and information, thus creating base data is less time consuming and it can be generated much more easily."* (I2)

When all the information and data can be found from the same system, this way the obsolete reporting and manual reporting is eliminated. That same happy interviewee also said that the automation has helped her to even balance her personal and work life and she is grateful that actually overtime hours have decreased. This is thanks to for example fixed reports which have to be executed by certain time, and they almost come by themselves.

Traditional management accounting

There have been clearly effects on traditional management accounting and some of these issues were already issued earlier. One of the interviewees stated:

> *"So in the financial administration the traditional accounting personnel have disappeared."* (I3)

He explains that there are for example controllers and their job description is largely sharing highly processed information further. As mentioned before, a great thing what the ERPs have done, is enhancements for collecting basic data from ground level. Thus the information is much more accurate, and now is the time for Business Intelligence to utilize that phenomenon for example the information brought by different ERP modules which it does it automatically. The assistant financial officer continues that all kind of work that is possible to be automated, will automate in the next 10 years. If somebody is going for financial administration field and only learns how to do routine tasks very well, he will be in trouble in the future, when you have to take more comprehensive views on issues. Additionally, he says that if the issue of how can we expand management accounting is thought somehow, this BI system can operate as accounting systems. This is because there is lot of functions that are out of operative activities, hence there is for example reports that tell about changed customer payment habits, which can be a huge time saving factor. Whereas the old systems would require individual reports about customer payment habits, so in the worst case scenario the management accountant would have to go through every individual invoice which can be even in paper form. BI can save a lot of

time, when reports can be generated and people could see all their company's customer payment times, average times and standard deviations.

4.3.2 New skills and competencies

As it has been discussed the emergence of new technology requires lot of new skills, and other factors like dynamic business environment influences to expected competence portfolio of management accountants. These new skills might be relating to IT and social competences, or management accountants' roles as educator, consultant or sales oriented professionals. The CFO of one of the world's leading enterprise software companies summarizes the most important required skills from management accountants:

> *"Accounting needs data from external sources and about outside world, that they understand large entities is important. Another are these presenting skills, as a management accountant you cannot stay only in your own silo".* (I7)

IT skills

The interviewee also says that when someone comes and asks about that information, then you need to boldly push forward your own views. He continues that:

> *"The meaning of Excel decreases, then the visualization of data emerges it comes more important and you need to make data look sensible and understandable."* (I7)

Maybe the underlining things are visualization in expanded meaning, when for example management accountants generate information for other organizational members and bring the data closer to reality. Hence presenting skills are emphasized. An excellent quote comes from the late Steve Jobs who once told that one of his mottos related to presenting things was that "tell it to me like I am 5 years old". I myself try to emphasize this guideline when I am giving speeches and I think management accountants should as well. I8 also explains that their aim for everything, especially with BI, is that:

> *"It reduces basic exporting and entering, so all kind of manual work. Then this time could be used for interpretations and analysis and you can crosscheck that the data is valid"*

Another interviewee (I1) says that he has had more enthusiastic attitude to develop their accounting by VBA and other tools, and he feels that those skills have become increasingly

more important. This is because when management accountants understand IT, they know what can they ask or require from their IT function. I8 reinforces the views of ever more important IT skills by saying:

> *"I think that excel will not be enough, that you need a better system where it is easier to integrate data from separate sources."*

According to her that is the reasons why different technical skills and competence are important. One interesting point is raised by her as well:

> *"What might be new is that management accountants have to learn to use SQL databases."* (I8)

She believes that management accountants may have to code some things there, and if they can do it themselves, it makes things so much easier and you do not have to take a consultant for it. So instead of excel skills SQL skills may become more important in the future. Another business controller (I4), thinks of his study times, and argues that if he would not have picked IT or equivalent subject for his minor, things would be more difficult. Another part of the skill set is the Excel, but strongly on third place is different kinds of IT issues, so what kind of systems have accounting professionals used. He sees that Excel and knowing basic figures is the outrigger, but indeed system know-how is very important at the moment and the importance only grows in the future. Additionally, every system that management accountants have used will bring advantages to them, because more or less, the legalism is the same.

Social skills

If the old-fashioned bean-counter times for management accountants are compared to present, it can be seen that the situation has changed drastically and social skills are one of the top priorities, when companies search for example controllers.

> *"The kind of social skills and competences, you need to be at least in continuous contact with different kind of organizations, and if you do not have the social know-how, then you do not get the best out of them."* (I6)

The CFO continues that it is quite challenging in accounting these days, when combinations of these two characteristics is needed or even required. However, it is not obvious because one of these features is usually stronger in a person, and seldom there are those who master both of those sides. Also in many cases they do not even have to master those, but the competences or readiness have to be there. Related to this is that:

"Thus I need to have conversations with these extremes and put myself in their (business managers) shoes in some level" (I5)

Companies might have very different kind of business controllers as persons for example relating to their social skills. One of this business controller's tasks is to have wider conversation with managers and the ability to talk with different level members of their organization. For example, he might have to teach floor level personnel what a revenue actually means, because there might be people who do not have academic backgrounds. Then there is the other extreme like executive level, who thinks matters so differently for example are they going to execute this level acquisition or how important is this customer to us. Moreover, it may be hard to communicate about bad things as I8 explains that at that point social competences are very much highlighted. It is really important that how people communicate those issues and in her opinion management accountants need to have situational awareness and 'eye for the game'. In addition, if they do a discovery in their organization, who do they communicate to and how, which is very vital. One of the CFOs states that:

"But the skill set that is required from accounting, the social competences is important, which has not been a traditional requirement from controllers." (I6)

Maybe this requirement has been already traditional for CFOs in larger companies, when they actually need to be in contact with different stakeholders. He also describes that he would like that his future controller would be analytic, thrives on numbers and understands large completeness, that how a thing B realization will impact to the future. That is clear, and it has always been. I2 explains that she has been working with sales and marketing function and the meaning of that experience has only increased. There is an example about how creative type of people, to whom usually figures and numbers are not so familiar and enjoyable thing. In many cases they actually avoid them, but fortunately nowadays it is possible to make data more understandable and meaningful even for them. The sales-oriented mindset is also raised by another interviewee:

"But I feel that I could participate more in sales meetings, which our CFO has started to do." (I1)

Management accountants are much more involved in real-time social interactions through for example phone calls, mails and different communication tools, where in their organization accounting has been quite invisible in many ways. Not lot of people hear from them except if there are for example some difficult issues in salary matters. He has tried to take more active

role that he could produce information in real-time, if he notices some odd thing. For example, he may notice that the sales record is going to be broken, so he can acknowledge sales people or whole company by saying 'Great job guys!' because this information becomes to his attention first. Additionally, when they are in their office and he hears people talking about some new service concept or other issues, he listens to it and can construct more comprehensive view about the matter. Then he is able to make more proactive decisions or measures, before others even ask him about it. In the end management accountants are a versatile group of people:

> *"Sure there are always people who have different job descriptions, if compared to us we have over 50 people in Helsinki headquarter, but they are really different kind of people."* (I4)

According to him in his own job, there might be days when he is in contact with 20 different countries. Especially if there are problems, or something should be done faster, how does he communicate it to get the best possible answer? Traditionally thinking accounting or bookkeeping personnel are seen as number crunching individuals who sit by themselves in their own corner and they do not talk much to anybody. He argues that actually it is harder to find a job where someone would be more in contact with people or it would have a bigger role. The fact is that management accountants job nowadays is related gathering data, information and every kind of possible communication is collected all around. Hence he feels that being social is a requirement if one wants to work and be successful in management accounting in the future. Accounting professionals need to get along with people, know how to open their mouths and see the social situations in a right way.

Educator role

One great term came from the sales controller:

> *"Thus management accountants can be like 'bridge builders' between certain functions."* (I2)

This is because their role can expand even further in the future. She compares the situation and explains that she has found out that in consulting field, when for example someone from IT department comes and teaches IT issues or use of the new systems. In her opinion they are not the best teachers and she has heard that their sessions have not gone as planned, and lot of people lose their nerves when they do not learn anything. She concludes that she could imagine that management accountants might have a kind of educator role in the future, where they teach other organizational members to use BI systems and other IT related issues. Another business

controller (I5) adds that just last week he was teaching what a revenue means, that when employees do something in a specific way, how does it show in their systems and figures. This is related to the fact that 95% of data is created by them and if there is a mistake he asks them, why have they done this calculation or hour entry like this etc. Another interviewee intensifies that view by saying:

> *"If not only my own unit would have the know-how for these things, but instead basic competences and skills could be expanded (for other members of the organization)."* (I8)

She thinks it would be a great step forward and in a sense that people are afraid of numbers and they think figures are difficult is quite old fashioned way of thinking. But numbers are not so difficult and she has noticed that they are actually really interesting, when one starts to understand them.

4.3.3 How is the role going to develop in the future?

In this last subchapter I am going to discuss about how the interviewees see the phenomenon called BI and role of management accountants developing furher.

> *"It used to be that a management accountants had lot of manual work and might have worked on one graph the whole day, but this will change drastically in the future, and more applied methods will be used, and for example controllers search more actively more sensible work for themselves."* (I1)

The BI system will give dashboards automatically and in real-time, thus management accountants do not wait questions from management anymore, but they actively produce information for them and similarly CFO will become more proactive leader. When people learn how to use the systems and systems become more user-friendly, the possibilities for mistakes will decrease drastically, which have been clearly neglected in the implementation and development stage of BI systems. I2 outlines the future by saying:

> *"In my own job, management accounting is very much concentrated on internal issues and some kind of expansion of the role for understanding external world like market knowledge is expected in my opinion."*

Thus management accountants have to evaluate how are markets developing and how the external factors will influence them. This is possible, because not as much time is spent on

manual work. If there is a huge work load, people should firstly concentrate on internal issues are make sure they are under control and monitor them. One does not always have enough time to think outside of the box, but in the future there should be more time because of automation. The interviewee talks about how he would want to develop his role by saying that the most rewarding part is when systems support your own work activities. That he has been able to construct new views for the monitored issues. Through them he has understood and is able to visualize certain kind of trends, thus creating the base knowledge, what he would not been able to see before. Then if he can spread it further to other members of the organization and others think it is useful as well, that is the most rewarding thing. The CEO continues by saying that he cannot answer on technical side how BI solutions and utilization is going to develop in the future, but:

> *"I feel that in the future much more external data from outside world is collected and capitalized on, thus information about customers, products, phenomenon, new products and such (becomes ever more important)."* (I3)

Somewhat the BI systems already have these characteristics, but in the interviewees' opinion understanding most of the information comes from customers' own CRM, which sight is pretty narrow and does not reach very far. Thus the kind of information, where the world is tomorrow and day after tomorrow will become ever more meaningful and important. The conditions of markets function well and profitable institutions' conditions will produce things, changes in demand and all this sort of information will be viable. He also says that:

> *"The importance of sales and the data related to it will become much more important."* (I3)

Hence this outside data represents the current or upcoming changes that may happen. To sum up, it is about acquiring knowledge and information which will tell something about tomorrow. Today, if there is a ERP system that is built from many different modules and on top of it there is a modern BI system which combines and refines information. He states that he cannot picture anything else than companies will need external information to support their internal information, which will tell about strategic changes. There was also talk about new more IT oriented roles for management accountants such as CDO (chief data officer). The CEO thinks that it might be a future role for group controllers or even CFOs. He talks about a concrete example about Big Data, which is related to their customers and stakeholders. CRM information can be accessed through BI maybe already at the moment but it will only increase

in the future. This is a concrete example what kind of information does BI systems include in near future. In addition, I4 argues ponders that lot of management accountants' tasks will be automated. He argues that this change will decrease reporting levels and layers, and fasten the process. Hence BI systems will erase the need for some kinds of expert work and tasks, but overall the emphasis will change towards business side. One of the interviewees thinks that already now but even more in the future:

> *"Your CFO is not anymore only related to reporting to owners or board, instead he is an assistant for CEO and business development, and is not only focusing on cash flow calculations and compulsory reporting."* (I5)

More and more it is that management accountants are developers of business and they have adviser types of role. CFO needs to be partly responsible for running the business, but in the end controllers, or CFOS, should not be accountable for the profitability of some unit or overall. Maybe in the big picture it can be seen that only business controllers' role has changed towards business developer, which is quite universal for all organizations. This kind of role has lot of demand in job markets, and they search that executive level would have a sparring partner and adviser from them. This kind of data utilization level and demand for different companies will increase a lot, but in many cases controllers might be a universal role and in others more technical and concentrated on company specific issue. One interesting review was that:

> *"It (only a supporting role) is dangerous for the function (management accounting) for them, the role should be understood as in the middle of different business functions not somewhere in the side."* (I6)

Hopefully BI systems will change in a way that accounting and other functions function more and more in same integrated systems in the future. This way there are no different systems or reporting practices for accounting and different functions, then naturally accounting approaches other functions and business because of this. Thus it participates truly through this to more operative actions, what the interviewee personally would like, so accounting would not see itself as supportive function but more like a business unit. There is optimizing of some operations, hence the support function is a term which is quite dangerous, if management accountants think that they are there just to support other functions and personnel. Moreover, bringing some accounting boundary conditions that how some things should be reported, what does accounting laws say about the issue, and what is also important to take into account

taxation side of things when companies go to international issues. These practices and issues will never disappear.

One of the CFO states and argues that:

> *"The predictive analytics will be the buzz phenomena of the future. As accounting's basic transactional tasks which traditionally shift to service centers to low-wage countries, they can be done by robots in the future."* (I7)

He also thinks that the analytics can be integrated as well. There will be more analysis of information from generating the information. It might be a challenge for controllers, that when time is released from controllers and some things are automated, then they need to do some kind of value adding work. Moreover, many have to solve that what is this value adding work and go outside from accounting traditional role, so management accountants do not only stare at the financial numbers, but also markets and competitors' information, thus expanding the horizon of analysis. I8 continues by picturing the future and saying that there should be:

> *"More time for interpretation and picturing the comprehensive picture."*

Management accountants should get the information in a sensible way to the system and they can think more of that. This could be the result and different kind of figures that support it. She states that management accountants should have more time for specific interpretation and calculations in the future, if they for example think about specific issue's profitability. Hence, more versatile and comprehensive analysis is needed. She hopes that making the reports herself and generating figures would take less time and more time would be directed for analysis, because that is the most important part. One of the service providers (I7) raises quite a futuristic service or product called digital boardroom. The idea is that there are three touch screens, where people have access with their company's analysis products. It produces kind of support space for management work and this kind of BI view. Benefits relate to that there is a real-time data all the time and management can get rid of the process of generating Power Points and such. He argues that this is and will become a very important tool or issues in the future. However, one of the interviewees explains how real-time phrase is often misused:

> *"The real-time factor is usually wrong used term for example how we exploit Vainu (Big Data software related to customer management) is that we get at some point of the week the software's observations about last week, which is quite like real-time to us, it depends on the matter what can be understood as real-time, and today's technology can produce that already."* (I3)

He says that he does not see that as a vital question. Then how real or valid is the data, is much more important and crucial. Even if people would know things in more real-time but it is without your knowledge false information, you can go wrong and really badly. He says that he prefers more valid than real-time data anytime. I have discussed about should management accountants be worried about their jobs because developed IT, BIS and automation and one of the interviewees said that it is a good question. However, he states that it will take some that AI (artificial intelligence) is in such a level, that it competes with humans. After all it probably demands human mind to do the analyses still.

5 Findings and discussion

In this chapter I am going to present some of the most important and interesting findings that emerged from the interviews. The purpose is to reflect those findings to theory and discuss if theory and empirical findings are congruent. Additionally I will talk about what kind of theoretical implications have been found and what have been the main contributions of this thesis. Similarly, managerial implications will be discussed, so what kind of inferences can be made from the findings and analysis of them.

5.1 Theoretical implications

The research about role changes among management accountants is already about 20 years old and technology has changed a lot from those times. Therefore, I feel that it was important to update how modern technology has affected to the roles of management accounting professionals. Many of those role studies are old-fashioned and they do not represent truthfully which kind of roles management accountants have taken nowadays. Prior literature emphasized that IT has developed for centuries and clearly transforming management accountants' job description and tasks like generating better quality data (Sangster et al., 2009) and it has had enormous influence in decreasing routine and manual work (Kahraman et al., 2011). Gullkvist (2013) highlights that lot of this role and MA practices changing and is due BI solutions. These academics findings are similar to my thesis' empirical findings, which implicate that in the future one of the most important tasks for management accountants is to validate the data and make sure it high quality, since more and more decisions are based on numerical analyses. Additionally lot of routine work, such as Excel typing and data transferring, has been eliminated thus management accountants can use their time for more value-adding tasks whatever they are.

From the beginning of this thesis, one of the main questions for me and this research was that how people actually understand Business Intelligence and the purpose of it. Lot of different definitions rose from academic studies and empirical findings. From one of the earliest definitions stated that BI is a "set of concepts and methods to improve business decision making by using fact-based computerized support systems" (Ghazanfari et al., 2011). Lot of other researchers also understand BI in a similar manner and almost all interviewees

highlighted that it should not be understood only as a certain kind of system per se. I1 explained how management accountants and others should shift from intuitive and emotional decision making to more fact based approach, even though intuition has a place in corporate world as well. Another definition by Williams (2004) is stating that organizations need to collect all-around information with the help of modern technology, since it has the capabilities to produce insight for profit and business opportunities. I5 expands this view and explains how BI can be seen as a first or second level on how companies utilize knowledge and information in their business. Figure 2 (p. 22) by Popovič et al. (2010) describes the expanded concept of BI and how it includes internal organizational factors and also external ones. According to this view the purpose of BI is to leverage information assets within key business processes in order for the company to enhance their performance. Moreover Cheng et al. (2009) explain how decision support systems and knowledge management should be integrated to some extent to generate synergies. This phenomenon of combining data from different sources is emphasized also in empirical findings and for example I3 stresses the fact that in the last resort, the systems need to serve the users and companies and thus systems need to have easy usability and be logic. Because if they are not, people attend not to use them, benefits will be remained not being attained. One of the biggest obstacles for the effective use of BI systems seems to be the complex functionalities and for this reason, there is lot of utilization room for improvement how to get additional value from BI.

Many of the interviewees saw even Excel as a kind of BI system, since data can be exported there from different information sources and even visualization is possible with that tool (for example I6). I have had to really thought it myself as well, that why Excel could not been seen as BI system, if it combines data from different sources and there are visualizing features, different tools, power pivot, thus it could be understand as a BI system in some cases. As I5 explains, standardized systems enable better distribution of information and gathering input, which is a major factor. Hence, if people know how to utilize, and depending on this could it be understood as BI system, then we can say that BI features are being exploited. Because of these findings and analysis, I strongly argue that BI should be understood as a broader concept than just a specific system per se.

The further developments of management accountants' role have been quite evident in both theory and empirical studies as for example the Figure 4 presents (p. 27). Granlund and Lukka (1997, 1998) portray how management accountant's job description has expanded from the traditional historian and watchdog, towards roles like adviser, consultant and member of

management team. The role used to be quite concentrated on the past and as many refer to it as "looking in the rear-view mirror", but nowadays the role is emphasizing the present moment and moreover the future, which is why management accountants do lot of predictions and evaluate the future. Lot of this is related to the increased capabilities of IT and modern analytics tools. However many of these changes are not due technological innovations, but at least many of the interviewees (for example I5) argued that reasons behind the transformed role is the management accountants themselves and are they ready to take on new unknown challenges and willing to develop themselves even further. Much is dependent from the skills set that management accountant possesses and do they have the needed curiosity to go beyond their traditional role and be a proactive member of the organizations. Hence, how comprehensible the role might become is related to management accountant's experiences like for example I8 states. Lot of the academic researchers concentrate on technological innovations that modify management accountants job description, but in my opinion and support from empirical findings, I suggest that much more issues are related to the phenomenon and increased responsibilities of management accountants. Hence, the development of the role has to be seen as a quite complex concept, where internal and external factors effect on the role, and specific elements for example the certain company, industry, personal characteristics and desires, and utilization of technology are influencing on how the role is going to develop in the present moment and especially in the future. Kind of a hypothesis of mine is that management accounting's role may change more IT oriented and roles like CDO (chief Data Officer) might emerge. This may in fact be a role for former management accountants and CFOs in the future. Moreover issues like Big Data, data warehousing may effect to the phenomenon as accounting has the ability to become a function that joins all the other functions. Hence it is not thought as support function anymore. Accounting issues might become a tool for all the other functions and the question is, how people utilize accounting and technology like BI in their decision-making and other issues.

Lot of discussions and hype has been around the bean-counter role of management accountants (e.g. Granlund and Lukka, 1997; and Vaivio and Kokko, 2006). They emphasize that even though the IT and other elements influence on management accountants' roles, the traditional role is not disappearing anywhere. This theoretical implication gets some verification from the interviewees as quite many of them stresses the fact that the bean-counting tasks might also be left for management accountants. It depends on the person, but it is evident that new technology like BI will decrease the importance of traditional bean-counter tasks as those are automated.

Hence it can be argued, that bean-counter role is going to fade in some sense in the future, as modern tools will execute those tasks and management accountants will have to figure out, how are they going to do value-adding tasks for their companies as for example I7 states. Moreover the kind of tasks that can be considered strategic, business and future-oriented will instead increase drastically (Granlund and Lukka, 1998; and Vaivio and Kokko, 2006). As I6 explained that it would be easy for management accountants to stay in their own silos and do 'basic good' work, there will be those number cruncher types of tasks still in the future and they are not going anywhere. But for example with technology there will be changes about what the role might be, and there will be more time to analyses, even though you would work from your own corner. Companies still have to think about really traditional matters such as variable and fixed costs, and how should those costs be allocated, so it is cost effective but still accurate enough to evaluate profitability of different customers and different cases. Even though there is lot of controversial opinions about the bean-counter role and is it a phenomenon which is been rejected in modern times, I feel that those bean-counting skills will still be important in the future, as management accountants need to understand what the machines or modern technology is actually doing or calculating. Without this kind of comprehension, the benefits and exploitation of systems will stay on moderate level.

Another interesting concept or phenomena that is referred in this thesis, is the role theory and legitimizing new roles. Goretzki (2013) explains that in institutional level management accountants will have a task to stabilizing their new more comprehensive and business partner role and actually it means recreating their identities, as for example more social behavior is expected from them. This means also that accounting professionals have to connect institutional environment to intra-organizational one to really legitimize the role transformation on a broader level. This view is supported by empirical findings, even though the issue was not concentrated on the interviews that much. Nevertheless the interviewees described the situation, how management accountants are the driving forces themselves, when it comes to stabilizing or legitimizing their new roles. I3 claims that the recent developments in systems have actually enables the new roles of controllers and other management accountants. However another interviewee (I4) argues that he has not seen a massive change in controllers' role, but maybe more in the work practices which contribute to the whole entity; what is the role of modern management accountant? In addition he states that the next 5 years are actually going to be the ones, where massive transformations can emerge. The institutionalization of new emerging roles is an on-going and continuous process and it is especially interesting in this

context. I would argue that complete stability or legitimization will not happen even in the far future, since work roles are very dynamic concept and realized differently in different organizational or international environments. However inside of organizations, management accountants might have to legitimize their new roles, so cooperation and the authority will be in its best level. Otherwise the situation might be, that if the new role does not have any kind of legitimization, other members of the organization do not have the required trust for modern management accountants, because they can be seen as those old-fashioned almost irritating 'controllers' who only restrict their action, and this will harm the whole business.

5.2 Managerial implications

There are lots of managerial implications that relate to this phenomenon and I will present and discuss the main ones in my opinion. Some of the benefits are quite evident, but lot of them can be questioned. However what is important is to remember, that modern technology like BI should not be thought as intrinsic value, but more in-depth analysis of the advantage has to made (Elbashir et al., 2008). In my opinion some companies incorrectly understand BI as intrinsic value and they do not think, what are the concrete benefits from the systems, which might become a problem? This concerns all reporting, when companies do reports just for reporting, and they do not really evaluate what do they use them for. Additionally the difficulty is that these gains are hard to measure, even though the evaluating costs would be quite straight-forward (Lönnqvist and Pirttimäki, 2006). Maybe the most clear benefit is the time saved by management accountants and I1 explains that with modern technology, he can offer information immediately like standard deviations in salaries or current figures from sales, with just few clicks and generating the figures does not take as much time than before. I7 continues that not as much manual labor is required than before, but the time can be used for example for information refining process. I3 argues that essential figures and ratios can be extracted from BI systems like revenue per person and these kinds of ratios should be key point of interest for the executive level. He continues that the traditional accounting reports have been very much concentrated on the past, e.g. wage costs of last month, but these do not explain much and it is hard to utilize this kind of information on its own, since it does not support well decision making and making conclusions. The task for modern management accountants is to distinguish longer-term trends and what are the causalities of matters. So in a way, as I2 states,

the purpose for BI is helping to create a comprehensive picture or visualization about different matters or how for example the KPIs had been developing.

The visualization aspect is highlighted by both academics (e.g. Gullkvist, 2013) and interviewees, but maybe even more in the empirical studies. This feature should be tool to construct the data and information in to an understandable form, so people actually get something out of it. I7 explains that if the data is mainly just numbers and it is left without a proper visualization, the interpretation of data might be difficult and benefits are again left unachieved. He adds that the importance of Excel probably decreases but at the same time the visualization of data increases and management accountants are required to make data look sensible and easily understandable. Maybe the underlining things are visualization in expanded meaning that you generate also for other organizational members the information and bring it closer to reality, thus presenting skills are emphasized. Some of the interviewees saw this element as one of the most important one, and these tools can be also understand as completely own area. The combinability of data and visualizing it in sensible way is ever more important as many of the decisions have to be quick ones because of dynamic business environment and continually changing situations. However I7 raises an excellent point by saying that visualization should be "the icing on the cake", since if the data is false and in bad shape, this visualization feature is pointless. This also means that validation of the data is part of management accountants' task list nowadays.

I1 stresses the possibility for errors and inaccuracy in emerging technologies, because people themselves are generating the data. He adds that the finding process of errors might be extremely time consuming, and organizational members should be taught properly how to use the systems. This would minimize the possibility for errors, if for example accounting people would work as consulting and educating personnel for others. The literature review discussed about how data should be good quality and Kahraman et al. (2011) explain the definition of IQ (information quality), which is already better because of modern technology like Business Intelligence. The data should come from inside (financial and operative data) and outside (data from markets) of the company (Cheng et al., 2009). Furthermore Koupaei et al. (2016) emphasize how the data needs to be valid and good quality in order to conclude comparative analyses, which will steer the company in the right direction. I6 states that members of the organization can question the data's reliability, which will mutually eliminate the benefits hence the validation process of data is important for management accountants. Many of the interviewees see this as kind of a threat, if this task is neglected. One of the interviewees, I7,

continues that people should not trust the data blindly, since they might make harmful decisions based on false data. According to empirical findings, this may be quite big part of management accountants' role in the future, as large portion of produced data is generated by personnel (I5), which is why there is a quite probable chance for errors. Hence validity of data and ensuring it is very important and making kind of sanity checks. But also management accountants have to evaluate what is sufficient level of certainty or validity, because in many cases for example 99% validation is good enough, and for the last percent, they should not spent hours and hours.

I have discussed also lot about supporting decision-making, which seems to be one of the main competitive advantages from BI according to theory and empirical findings (e.g. Hannula and Pirttimäki; and Popovič et al., 2010). However, it has to be realized that these systems only support decision-making, not actually make them. Because if the machines would make the decisions, we would not need supporting type of roles like management accountant. In the end people will make also the decisions related to what kind of technology should the company utilize and final investment decisions. I2 discussed how their controllers got quite a significant role in their BI project and a project team was created with IT personnel. Furthermore their management accountants got to influence a lot on how the system was built and how the data should be gathered. So in the end management accountants' role is to utilize systems for their advantage, thus they will probably have big role in IT issues for example choosing the right systems and implementing them.

In the literature review the modified onion model (Figure 2) was presented by Järvenpää (2001). The figure implicates that recent development trends, in for example IT, has affected the role of management accountants, which has further influenced on the required competencies from them. Additionally the modern MAIF (Management Accounting Information Framework) describes how the goal for organizations should be to create a single and comprehensible database for information. This can be achieved with the help of BI solutions. Empirical analysis confirms this framework concept and for example I2 highlights the integrated systems and collecting information from various systems to produce real-time information for management. Members of the organization need to have an access to real-time information in contemporary business environment, because it supports their decision making which is important factor. Thus getting information from different data sources at real-time basis is very important nowadays. According to I2, if there are differing figures and they are not updated in real-time, people might actually question the whole system and the belief for it may shake.

Clearly companies and management accountants are focusing on creating or implementing effective systems, automation, decrease of routine work and their role is becoming more comprehensive and it has brought new challenges. Nowadays when data is collected quite automatically and systems like BI merges information to comprehensible knowledge, management accountants already gain and will gain even more time for analyzing the data, which according to many interviewees should be the main task, that accounting professionals use their time in. Järvenpää (2011) explains that routine tasks have been disappearing quite some time, because of the modern technology and information systems. Moreover there are larger and faster databases and tools for transferring the data, which creates more flexible options, for example relating to reporting. Granlund and Lukka (1997) proved that integrated accounting information systems have the same effect, of decreasing manual work, which gives more time for profound analyzing and genuine decision making. I7 figures that there is not as much data crunching than before, but management accountants can get the desired views ready, which gives time to concentrate on data analysis. Traditional ERP systems cannot usually combine the data on its own, hence BI systems are vital in the future, and as phenomena like Big Data is emerging and information utilization reaches new heights. Koupaei et al. (2016) stresses the fact that these ERPS are not flexible enough systems, but they are a great tool for storing the essential data which will be used further for the analyzing purposes of BI, since there is lot of value in companies' data resources (e.g. Elbashir, 2008). As I have learned and highlighted, these ERPS and BIS are not competing systems, but instead they should be thought in a complementary manner. Not all firms actually need ERPS, depending on their industry and business, so BI can exist without ERP systems and data sources might be for example CRM and project management system, as I8 explained their situation. Another factor that is relating to automation phenomenon is openness of companies, which was raised by few of the interviewees (e.g. I2). Nowadays almost everyone in the organization has an access to the system or some chosen members have it, depending on how openly the organizations want to spread their information. This eliminates for example obsolete work and manual reporting, since the data can be found from the same system. Additional comment comes from I4 as he explains how data is taken straight from ERPS to visualization systems and presentations for management can be produced there, because those systems have modification capabilities that managers can use themselves. Thus it can be seen that lot of accounting activities is empowered to other managers than financial administration or controllers. Hence, emphasizing empowerment by giving more and more responsibilities to every organizational level with user-friendly BI systems, which can help even for example ground floor level to make their own

budgets. This factor is supported by I3, as he mentions that one of their slogans' is "the decentralization of responsibilities". Additionally I2 stated that BI has actually enhanced her quality of life by better balance of work and personal life. This is because BI helps with generating compulsory and fixed reports that have to be concluded by certain time. Hence it enhances productivity, work wellbeing and maybe even decreases mental health problems, since people have time for other things than work also. This factor is very important to me, since I am probably going to start my own company related to work wellbeing and mental health issues.

Modern skills set

The required or needed skill-set of management accountants has become much more comprehensive than before. New BI systems have given time for management accountants to analyze specific issues even further, if we compare to the bean-counter role that they used to have. Hence it is quite evident that that the role is quite comprehensive. Now the time saved can be saved for interpretation of numbers and explaining others, what should they see and understand from those numbers. Lot of interviewees emphasized the future-orientation for management accountants, but I3 implies that the term strategy is often referred incorrectly. There are visions, what should be done in long-sight and what are the practical measures, but in many cases talking about strategies should be avoided. Thus actually the rear-window mirror view is decreasing and management accountants do more forecasting, simulations and analyze different scenarios already now but even more in the future. According to I2 Integration of data is an important task of Business Intelligence solutions. It gives more time to communicate with the management level and concentrate on creating additional value, or solving specific problems or obstacles. It makes sure that more time can be spent outside management accountant's own screen. This way the management accountants can bring their own views to discussions when they have the opportunity to seize better the business, and they do not have to concentrate on the manual or routine activities. As also mentioned in literature review and empirical chapter, one of management accountants' new roles is kind of an educator. I2 mentioned how their IT department has given lectures on how to use systems and often the training sessions are too technical and people do not understand them, finally losing their nerves which might decrease the use of for example a new BI system. She added that here is a great opportunity for accounting professionals to become like bridge builders between different functions and widen their role even further. This is because accounting function deals with lot of other functions, thus this supports the view that management accountants could become

consultants and educators, as it has started to transform already. Authors (e.g. Malmi and Granlund, 2002; and Olszak and Ziemba, 2003) support this view since in many occasions management accountants have to teach or educate other organizational members on, how to use for example ERP or BI systems, and about non-accounting ERP matters. Moreover it is said, that accounting professionals might be assigned to educate users to develop their skills to model, identify, verify and code knowledge to properly store and utilize knowledge and information.

One interesting points was found out in empirical studies by I6. Accounting has been seen as a support function in many organizations, but that might be dangerous for the function itself. Lot of academic researchers also highlight the support element of decision making for management accountant, like Kahraman et al. (2011) talk about IDSS (Intelligent Decision Support System) and how the systems work together with management accountants as consultants to support managers with their decisions. Saangster et al. (2009) adds that management accountants become kind of business advisers, which is one of the emerging roles for them, in companies and they take proactive steps to support executive level decision making. This supporting role is extended from executive to lower level managers in organizations as well (Elbashir et al., 2008). Business Intelligence is really relational to this factor, since it is vital in creating information and it gives lot of support for decision making (e.g. Popovič et al., 2010; and Koupaei et al., 2016). It is a complex phenomenon, but management accounting should stop seeing itself only as a support function, but instead organizational members themselves can do analyses based on accounting information, thus accounting becomes a useful tool for the whole organization and it can be seen as a wider concept which is meant for everybody. In the end the supporting side of management accounting is and will always be important, but I stress that accounting professionals should not seem themselves only as support function somewhere in the side, but instead as I3 stated; in the middle and heart of business. Hence as a support function, that how do people see management accounting settling for different organizational levels, how people understand the concept of accounting and how BI is related to that? Thus not only management accountants realize these things but also other members use and understand them. Other members of the organization should understand what these figures mean for them, and there is also the accounting function which helps to explain it more in-depth way what do they mean?

6 Conclusions

In this final chapter I will concentrate on presenting the main findings of this thesis and what kind of contribution the study offers. I will also revise the research questions and objects, and analyze have the study been constructed according to them and have the initial goals been achieved. Additionally I will evaluate the validity of the research, discuss about the restrictions and possible future subjects.

The objects of the thesis were to demonstrate that relevant research about BI and its influence on management accountants' role is scarce and the phenomenon is very topical. It seems that the topicality factor is very clear and additionally there are not enough researches about the subject, thus this thesis argues that more studies should be concluded about matters like BI and how it affects the roles and responsibilities of modern management accountants. Gullkvist (2013) found that use of BI solutions might have quite a significant impact in MA practices and further for management accountants' roles and tasks. He emphasizes that the finding is quite novel, thus more studies are required to analyze the phenomenon in a more in-depth manner. The topical side also comes from the fact that these new systems are here now, but the utilization of these systems is still quite restricted and underutilized, as many of the interviewees pointed out (e.g. I7). The most important factors in successful implementation and increasing the use and exploitation of them are the elements relating to usability (Chaudhur et al., 2011). Users need to be trained, which can be a new responsibility for management accountants, and companies have to really ponder, what can be the benefits from BI and how can they achieve them.

One of the aims of this thesis was to create quite comprehensible but at the same time, compact definition of BI, in order to analyze the phenomenon better. Definition of Business Intelligence can be quite vague and complex, thus it is important to really explain and analyze what BI actually means, what is the purpose and main characteristics? Literature review maybe emphasized the system side of it, but empirical findings implicated that the concept is much wider, which was also the expectation of this thesis. Popovič et al. (2010) describe BI as an instrument, which generates business value, and how it achieves business-oriented knowledge by gathering and analyzing internal and external. The support for business and result-oriented decision-making is also seen as vital characteristics of BI and formatting and visualizing the

data from different sources into sensible and understandable format (Elbashir et al., 2008). Summarizing definition by Chaudhur et al. (2011) is that BIS are meant for different level managers and analysts in order to possess a comprehensive "collection of decision support technologies aimed to make better and faster decisions."

Additionally the research questions were:

1) How has Business Intelligence changed accounting profession and management accountant's role? (Main question)

2) What kind of new roles have management accountants received and taken? (Sub-question)

3) What additional value has Business Intelligence systems brought compared to ERP systems? (Sub-question)

If the main research question is analyzed, Popovič et al. (2010) argue that one of the most critical success factors of BI is to construct a bridge between IT and business in order to create competitive advantage. They also state that BI is an aid to enhance management accountant's decision-making process, so those solutions have effected their role. Furthermore, empirical findings and analysis implicate that BI should be a tool for transforming from intuitive decision making to more fact or databased one. Thus, information, figures and knowledge exploitation has a great role in this phenomenon. Therefore, in my opinion BI should be understood as much wider concept than just a certain system. Authors like Kahraman et al. (2011) stated that in contemporary business world technology and BI has a significant role as those are continuously developing, and the effects relate much to decrease of routine and manual work. Dechow et al. (2006) present that lot of the routine tasks are disappearing because of IT development such as BI solutions and this has facilitated management accountants' role change from bean-counter to proper future and business-oriented partners for management. Additionally according to the research, it is possible to organize and practice accounting in ways that are more flexible. Empirical findings support the view that management accountants are taking those explained partner roles, but they also add that much of the influence is dependent from the management accountant themselves as for example I1 explained. Hence not only new technology, such as BI, effects on the role of management accountants, but these professionals themselves can effect on their own role more than thought before. This view is also related to the first sub-question, which will be discussed next.

Even though Granlund and Lukka's (1997, 1998) research is two decades old it has lot of validity in modern times, but some of the views should be updated. According to them the role

and required toolbox of accounting professionals is much more comprehensible nowadays, which was also one of the expectations for this study. The research states that management accountants are transforming from traditional quiet number crunchers (bean-counters) towards socially talented business partners. This is supported by empirical studies and moreover modern management accountants have the possibility to empower other organizational members to use accounting and figures as tools in their everyday work life. New roles also mean new skill-set for management accountants. Literature review highlighted the role of technology, which seemed to be the biggest contributing factor for the emerging roles (Scapens, 2003). However, empirical findings stated that even though technology is one of the major elements, others like personal factors have a huge impact on, what the role might be in the future. Hence, my conclusion is that management accountants own experience, desires, motivation, courage to bring their development plans forward and timing are huge factors, which effect on their role.

Granlund and Lukka (1997, 1998) are arguing that management accountants should be thought as essential members and advisers of the management. They add that management accountants have been seen as watchdogs and consultants. Some newer researches and my conducted interviews reinforce this view, but they also state that management accountants have become also educators and sales oriented professionals. Many of the interviewees stressed that their experience from sales has been nothing more than really useful and essential. Therefore, I argue that in the future many management accountants' roles are somehow related to sales. Scapens et al. (2003) support these views, but also further explain that accounting professionals need to have IT and technical skills in modern business environment and many of their new roles are interacting with Information Technology. This thesis argues that because of these changes, management accountants might be given or they might take themselves, more technical roles such as CDO (Chief Data Officer). However it is clear that technical capabilities will only increase its importance in the future.

To analyze the second sub-question, Kouapei et al. (2016) discussed how ERP systems themselves are not enough in modern business world and BI solutions have the ability to add flexibility to them. Those traditional ERP systems are usually great places to storage the information, but according to the authors, they lack appropriate features for decision-making and analysis of vast amount of data. These are among the others, few reasons why BI solutions have emerged, because they can provide the needed integration for versatile data sources. Kouapei et al. (2016) explain that prediction and future-oriented dimensions are very essential,

when analyzing the meaning and purpose of BI. It could be understood, from the prior literature, that BI systems are superior compared to ERP systems but according to empirical findings that is not true. In my opinion, BI systems should be thought as extension components for ERP systems, since the BI solutions cannot work without high quality data on the background. Additionally many of the interviewees highlighted BI's visual features, whereas prior literature like Kouapei et al. (2016) and others did not emphasize it. In order to get the best out of BI, the usability needs to be in an appropriate level and the visual side needs to look sensible and understandable.

In order to evaluate is the thesis constructed in good manner and are the findings reasonable and sensible, I will discuss about the validity of the research. I concluded eight (8) theme interviews, which seems reasonable, but not too broad for master's thesis. When doing the transcriptions, I found that after 5 interviews the findings started to be quite similar, even though I feel every interviewee brought definitely something to the table. I gave the interviewees a chance to stay anonymous, but everyone agreed that their names and companies could be published and I feel this brings more validation for the research if the summary of interviews is reviewed. Additionally I wanted to choose versatile interviewees and companies, which in my opinion was a success and I want to thank all the interviewees for taking the time for the interviews despite their busy schedules. One restriction of the research can be considered to be that many of the interviewees said that they had no BI system per se in place and I could have chosen companies with this requirement, but it was actually interesting to study BI as a wider phenomena and how people actually perceive it at the moment. This consolidates one of the research objects of evaluating and analyzing different definitions of BI. Overall the field study method seemed to be the most suitable in the beginning and after concluding the research, I still feel that it served well the purposes, research questions and objects.

Suggestions for future research

One of the CFOs (I7), who was also working for a service provider company, raised many interesting capabilities of BI which will be essential issues in the future. Predictive analytics is taking more and more foothold in organizations and solutions like digital boardroom sounds very interesting and useful, and I feel these future possibilities should be further studied. It is clear that this phenomenon requires more in-depth studies as the amount of data is only increasing, and management accountants are in the verge of becoming even more vital key players of modern companies. Some comprehensive and more intensive case studies would be

useful, or surveys could bring more validation for my thesis' findings. Additionally it would be interesting to study how the legitimizing process of these new roles is developing and are other members of organizations, and especially management accountants themselves, ready to take on this new role and identity as social, IT-, future- and business-oriented accounting professionals?

References

Articles and books

Abernethy, M. A., & Lillis, A. M. (1995). The impact of manufacturing flexibility on management control system design. Accounting, Organizations and Society, 20(4), pp. 241-258.

Ahrens, T., & Dent, J. F. (1998). Accounting and organizations: realizing the richness of field research. Journal of management accounting research, 10, 1, pp. 42-68.

Anastas, M. (1997). The changing world of management accounting and financial management. Management Accounting (UK), October, pp. 48-51.

Arnold, D. O. (1970). Dimensional sampling: An approach for studying a small number of cases. The American Sociologist, pp. 147-150.

Arnott, D., & Pervan, G. (2005). A critical analysis of decision support systems research. Journal of Information Technology, 20(2), pp. 67-87.

Atkinson, A. A., & Shaffir, W. (1998). Standards for field research in management accounting. Journal of management accounting research, 10, 41, pp. 1-38.

Azma. F., & Mostafapour. M. A. (2012). Business intelligence as a key strategy for development organizations. Procedia Technology 1, pp. 102-106.

Banncroft, N. H., Seip, H., & Sprengel, A. (1998). Implementing SAP R/3: How to Introduce a Large System into a Large Organization.

Bhatt, G. D. (1995). Enterprise information systems integration and business process improvement: an empirical study. In Proceedings of the Americas Conference on Information Systems, August (pp. 25-27).

Booth, P., Matolcsy, Z., & Wieder, B. (2000). The impacts of enterprise resource planning systems on accounting practice–the Australian experience. Australian Accounting Review, 10(22), pp. 4-18.

Bruns Jr, W. J., & McKinnon, S. M. (1993). Information and managers: a field study. Journal of management accounting research, 5, pp. 84-108.

Bucher, T., Gericke, A., & Sigg, S. (2009). Process-centric business intelligence, Business Process Management Journal, Vol. 15, No. 3, pp. 408-429.

Burns, J., &Yazdifar, H. (2001). Tricks or treats, Financial Management, March, pp. 33–35.

Burns, M., (2005). Business intelligence survey, CA Magazine, 138, 5, pp. 18.

Burns, J., & Scapens, R. W. (2000). Conceptualizing management accounting change: an institutional framework, Management Accounting Research, 11(1), pp. 3–25.

Cheng. H., Lu. Y. C., & Sheu. C. (2009). An ontology-based business intelligence application in a financial knowledge management system, Expert Systems with Applications 36(2), pp. 3614-3622.

Chaudhur i S., Dayal U., & Narasayya V. (2011). An overview of business intelligence technology, Communications of the ACM, Vol. 54, No. 8, pp. 88-98

Curran, T., Keller, G., & Ladd, A., (1998). SAP R/3 Business Blueprint: Understanding the Business Process Reference Model, Upper Saddle River, NJ, Prentice Hall.

Chreim, S., Williams, B. B., & Hinings, C. B. (2007). Interlevel influences on the reconstruction of professional role identity. Academy of Management Journal, 50(6), pp. 1515-1539.

Davenport, T.H. (1998). Putting the enterprise into the enterprise system, Harvard Business Review, Vol. 76 No. 4, pp. 121-31.

Davila, A., & Foster. G. (2005). Management accounting systems adoption decisions: Evidence and performance implications from early-stage/startup companies. The Accounting Review 80 4: pp. 1039–1068., and (2007). Management control systems in early-stage startup companies. The Accounting Review 82 4, pp. 907–937

Dechow, N., Granlund, M., & Mouritsen, J. (2006). Management control of the complex organization: relationships between management accounting and information technology. Handbooks of Management Accounting Research, 2, pp. 625-640.

Dyer, W. G., & Wilkins, A. L. (1991). Better stories, not better constructs, to generate better theory: A rejoinder to Eisenhardt. Academy of management review, 16(3), pp. 613-619.

Elbashir. M. Z., Collier. P. A., & Davern. M. J., (2008). Measuring the effects of business intelligence systems: The relationship between business process and organizational performance. International Journal of Accounting Information Systems 9(3), pp. 135-153.

Elbashir, M. Z., Collier, P. A., & Sutton, S. G. (2011). The role of organizational absorptive capacity in strategic use of business intelligence to support integrated management control systems. The Accounting Review, 86(1), pp. 155-184

English, L. P. (2005). Business Intelligence Defined, retrieved October 20, 2016, from http://www.b-eye-network.com/view/1119

Eriksson, P., & Kovalainen, A. (2015). Qualitative Methods in Business Research: A Practical Guide to Social Research. Sage.

Fahy, M. J., & Lynch, R. (1999). Enterprise resource planning (ERP) systems and strategic management accounting. In European Accounting Association EAA Conference, Bordeaux, France.

Fahy, M.J. (2001). SEM philosophy, Financial Management, Vol. 10, pp. 33-34.

Friedman, A., & Lyne, S. (1997). Activity-Based Techniques and the Death of the Beancounter. European Accounting Review, 1997, vol. 6: no. 1. pp. 19 – 44.

Frishkoff, P., & Thompson, S. (1994). This Controller Wears Many Hats. Management Accounting, 1994, vol. 76: no. 5, pp. 42 - 44.

Frolick, M. N., & Ariyachandra, T. R. (2006). Business Performance Management: One Truth. Information Systems Management, 23(1), pp. 41-48.

Gbosbal, S., & Kim, S. K. (1986). Building effective intelligence systems for competitive advantage. Sloan Management Review), 28(1), pp. 49–58.

Ghazanfari. M., Jafari. M., & Rouhani. S., (2011). A tool to evaluate the business intelligence of enterprise systems, Scientia Iranica 18 (6), pp. 1579–1590.

Goretzki, L., Strauss, E., & Weber, J. (2013). An institutional perspective on the changes in management accountants' professional role. Management Accounting Research, 24(1), pp. 41-63.

Granlund, M., & Lukka, K. (1997). From bean-counters to change agents: The Finnish management accounting culture in transition. The Finnish Journal of Business Economics, 3, pp. 213– 255.

Granlund, M., & Lukka, K. (1998). Towards Increasing Business Orientation: Finnish Management Accountants in a Changing Cultural Context. Management Accounting Research, 1998, vol. 9: no. 2, pp. 185 – 211.

Granlund, M., & Mouritsen, J. (2003). Problematizing the relationship between management control and information technology. European Accounting Review, 12, pp. 77-83.

Granlund, M. (2011). Extending AIS research to management accounting and control issues: A research note. International Journal of Accounting Information Systems, 12, 1, pp. 3-19.

Gullkvist, B. M. (2013). Drivers of change in management accounting practices in an ERP environment. International Journal of Economic Sciences and Applied Research, 6(2), pp. 149-174.

Hannula, M., & Pirttimäki, V. (2003). Business Intelligence - Empirical Study on the Top 50 Finnish Companies. Journal of American Academy of Business, 2(2), pp. 593-600.

Hitt, D., & Newing, R. (1995). Multi-dimensional databases are good for ABC, Management Accounting, Vol. 73 No. 8, pp. 28-9.

Holsapple, C., & Whinston, A. (1987). Business Expert Systems, McGraw-Hill, New York, NY.

Hopper, T. M. (1980). Role conflicts of management accountants and their position within organisation structures, Accounting, Organizations and Society, 5(4), pp. 401 – 411.

Ibarra, H. (1999). Provisional selves: Experimenting with image and identity in professional adaptation. Administrative Science Quarterly, 44(4), pp. 764-791.

Jalonen, H., & Lonnqvist, A. (2009). Predictive business-fresh initiative or old wine in a new bottle, Management Decision, 47(10), pp. 1595–1609.

Järvenpää, M. (1998). Strateginen johdon laskentatoimi ja talousjohdon roolimuutos (Strategic management accounting and the management accountant's changing role). Publications of the Turku School of Economics and Business Administration, Series D-1.

Järvenpää, M. (2001). Connecting management accountants' changing roles, competencies and personalities into the wider managerial discussion – A longitudinal case evidence from the modern business environment. The Finnish Journal of Business Economics, 4, pp. 431–458.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. O., & Rosenthal, R. A. (1964) Organizational Stress: Studies in Role Conflict and Ambiguity (New York: John Wiley).

Kahraman. C., Kaya. I., & Çevikcan. E. (2011). Intelligence decision systems in enterprise information management. Journal of Enterprise Information Management 24(4), pp. 360-379.

Kallunki, J-P., Laitinen, E.K., & Silvola, H., (2011). Impact of Enterprise Resource Planning Systems on MACS and Performance of the Firm, International Journal of Accounting Information Systems, 12, pp. 20-39.

Kaplan R. S., & Norton D.P. (1996). The Balanced Scorecard: Translating Strategy into Action. Harvard Business School.

Katz, D., & Kahn, R. L. (1978) The Social Psychology of Organizations, 2nd edition (New York: John Wiley).

Keating, P. J. (1995). A framework for classifying and evaluating the theoretical contributions of case research in management accounting. Journal of management accounting research, 7, pp. 66-87.

Koupaei, M., Mohammadi, M., & Naderi, B. (2016). An Integrated Enterprise Resources Planning (ERP) Framework for Flexible Manufacturing Systems Using Business Intelligence (BI) Tools, International Journal Of Supply & Operations Management, 3, 1, pp. 1112-1125.

Lawrence, T.B., & Suddaby, R. (2006). Institutions and institutional work. In: Clegg, S., Hardy, C., Lawrence, T.B., Nord, W.R. (Eds.), The Sage Handbook of Organization Studies. Sage Publications Inc., Thousand Oaks, pp. 215–254.

Liautaud, B., & Hammond, M. (2002). E-Business Intelligence. Turning Information into Knowledge into Profit. New York: McGraw-Hill.

Lillis, A. M., & Mundy, J. (2005). Cross-sectional field studies in management accounting research-closing the gaps between surveys and case studies. Journal of management accounting research, 17(1), pp. 119-141.

Lu, Y.-C., & Cheng, H. (2003). Automated optimal equity portfolios discovery in a financial knowledge management system, computational intelligence in economics and finance. Springer-Verlag, pp. 387–402.

Lönnqvist, A., & Pirttimäki, V. (2006). The measurement of business intelligence, Information Systems Management, 23(1), pp. 32–40.

Malmi, T. (2001). Balanced scorecards in Finnish companies: a research note. Management Accounting Research, 12(2), pp. 207-220.

Marchand, D. A., Kettinger, W. J., & Rollins, J. D. (2002). Information orientation: The link to business performance. Oxford University Press.

Merchant, K. A., & Manzoni, J. F. (1989). The achievability of budget targets in profit centers: A field study. In Readings in Accounting for Management Control, pp. 496-520.

Mierzejewska, B. (2002). Knowledge management. Warsaw: Rzeczpospolita. Vol. 96.

Negash, S. (2004). Business intelligence.

Nemati, H. R., Steiger, D. M., Iyer, L. S., & Herschel, R. T. (2002). Knowledge warehouse: an architectural integration of knowledge management, decision support, artificial intelligence and data warehousing. Decision Support Systems, 33(2), pp. 143-161.

Olszak, C. M., & Ziemba, E. (2003). Business Intelligence as a Key to Management of an Enterprise. In Proceedings of Informing Science and IT Education Conference, pp. 855-863.

Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. Organization Science 3, pp. 398-427.

Otley, D. T., & A. J. Berry. (1994). Case study research in management accounting and control. Management Accounting Research 5(1), pp. 45-65.

Otley, D. T. (2001). Extending the boundaries of management accounting research: Developing systems for performance management. British Accounting Review 33 (3), pp. 243-261.

Parker, L. D. (2002) Reinventing the management accountant, transcript of CIMA address delivered at Glasgow University, 15 March, [online] (cited 4th of November 2016). Available at: http://www.cimaglobal.com/downloads/lee_parker_lecture.pdf (not available anymore)

Popovič. A., Turk. T., & Jaklič. J. (2010). Conceptual model of business value of business intelligence systems. Management: Journal of Contemporary Management Issues15 (1), pp. 5-30.

Quattrone, P., & Hopper, T. (2005). A 'time–space odyssey': management control systems in two multinational organisations. Accounting, Organizations and Society, 30(7), pp. 735-764.

Reay, T., Golden-Biddle, K., & Germann, K. (2006). Legitimizing a new role: small wins and microprocesses of change. Academy of Management Journal 49 (5), pp. 977–998.

Riistama, V. (1971). Laskentatoimen hyväksikäytöstä [Considerations on the application of accounting]. The Finnish Journal of Business Economics, II/1971.

Riistamo, V., & Jyrkkiö, E. (1971) Operatiivinen laskentatoimi [Management Accounting]. Weilin+Göös.

Rom, A., & Rohde, C. (2006). Enterprise resource planning systems, strategic enterprise management systems and management accounting A Danish study.Journal of Enterprise Information Management Vol. 19 No. 1, 2006, pp. 50-66.

Rogge E. (2005). Aligning business and IT to improve performance. Operational Research Intelligence.

Rom, A., & Rohde, C. (2007). Management accounting and integrated information systems: A literature review. International Journal of Accounting Information Systems, 8(1), pp. 40-68.

Scapens, R. W., & Jazayeri, M. (2003). ERP systems and management accounting change: opportunities or impacts? A research note. European accounting review, 12(1), pp. 201-233.

Scott, W.R., 2008. Institutions and Organizations: Ideas and Interests. Sage Publications Inc., Thousand Oakes, California.

Siegel, G. (1996). The Practice Analysis of Management Accounting (Montvale, NJ: Institute of Management Accountants).

Smith, M., & Briggs, S. (1999). From bean-counter to action hero – changing the image of the accountant. Management Accounting (UK), January, pp. 28–30.

Sobh, R., & Perry, C. (2006). Research design and data analysis in realism research, European Journal of Marketing, Vol. 40, Iss. 11/12, pp. 1194–1209.

Teorey, T., Lightstone, S., & Nadeau, T. (2006). Database modeling & design: logical design, 4th edn, Morgan Kaufmann, San Francisco.

Vaivio, J., & Kokko, T. (2006) Counting big: Re-examining the concept of the bean counter controller, Liiketaloudellinen aikakauskirja, no. 1, pp. 49-77.

Van der Veeken, H. J., & Wouters, M. J. (2002). Using accounting information systems by operations managers in a project company. Management Accounting Research, 13(3), pp. 345-370.

Wall, F. (2003). Organizational efficiency by integrated information systems versus management control? An agency-based approach. In 2nd Conference on Performance Measurement and Management Control, Nice, September, pp. 18-19.

Watson, H. J., & Wixom, H. (2007). Enterprise agility and mature BI capabilities, Business Intelligence Journal, 12, 3, pp. 13-28.

Webb, E. J. (1981). Nonreactive measures in the social sciences. Houghton Mifflin School.

Wieder, B., Chamoni, P., & Ossimitz, M. L. (2012). The impact of business intelligence tools on performance: a user satisfaction paradox? International Journal of Economic Sciences and Applied Research, (3), pp. 7-32.

Williams, S., & Williams, N. (2003). The business value of business intelligence. Business Intelligence Journal, 8, pp. 30-39.

Williams, S., & Williams, N. (2007). The profit impact of business intelligence. Morgan Kaufmann.

Yin, R. K. (2003). Case study research design and methods third edition. Applied social research methods series, 5.

Appendix 1: Interview summary

Date	Code	Name	Title	Company	Field of business	Relevant work Experience	Time
14.10.	I1	Alpo Panula	Assistant Financial Officer	aTalent	Recruiting	2 years	47 min
19.10.	I2	Jutta Varis	Sales Controller	L'Oréal	Cosmetics	4 years	41 min
25.10.	I3	Paavo Tähtinen	CEO	Gordion-talousohjaus	Consulting	+ 40 years	1h 28min
7.11.	I4	Miikka Hämäläinen	Business Controller	Outokumpu	Metal industry	3 years	45 min
8.11.	I5	Esko Puolusmäki	Business Controller	Cinia	ICT	6 years	1h 2min
9.11.	I6	Sami Kekäläinen	CFO	Vainu	IT software	9 years	49 min
14.11.	I7	Antti Makkonen	CFO	SAP Finland	Enteprise software	11 years	40 min
14.11.	I8	-	Business Controller	-	Software development/consulting	4 years	34 min

Appendix 2: Interview questions

For the companies

Theme 1: Role change and job description

1) How long have you worked in accounting function and what is your job title?
2) What kind of role do you have in your company and what kind of tasks are assigned to you?
3) What do you think is the traditional role of management accountant/controller/CFO?
4) How has your role changed overall for the last years?
5) Would you say you have more comprehensive role and tasks than before? How?
6) If your role has changed, what do you think are the reasons for the change?

Theme 2: Business Intelligence (systems) and knowledge management

1) How do you define Business Intelligence, what does it mean to you?
2) Tell about knowledge management in your company? (definition, what does it mean for you)
3) What kind of Business Intelligence systems do you use or your company has?
4) What additional value does BI bring about to ERP systems in your opinion?
5) What do you think are the possible problems and threats in BI systems?

Theme 3: What is the impact of BI (systems) to the role and job description of management accountants?

1) How have your company's BI systems changed your role and job description?
2) What kind of work has come obsolete after BI systems?
3) Has the introduction of BI decreased manual work? If yes, how do you use this time nowadays?
4) How do you think the role of a controller/management accountant/CFO will change in the future? (because of BI solutions, or generally)
5) Has your role changed more or less than you thought, because BI solutions (or new technology)?

For BI systems providers

Theme 1: Business Intelligence more generally

1) What is your role and job description?
2) How do you define Business Intelligence? What does it mean for you?
3) What are the biggest advantages from using Business Intelligence (systems)?
4) What additional value does BI bring compared to ERP systems?
5) What are the possible problems and threats in BI systems or in the implementation? What is important in the implementation phase?

Theme 2: BI changing the role and job description of management accountants (and others)

1) How has Business Intelligence (systems) changed work routines and roles inside companies? How about in accounting function?
2) What kind of work comes obsolete because of BI systems? How does it decrease manual work and support automation?
3) At the moment, how much do you think companies (management accountants) are utilizing BI solutions?
4) How do you see the use of BI solutions will develop in the future (focus in accounting function)?